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THE FAR EASTERN REVIEW

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Engineering Finance Commerce

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Contents

THE SALT GABELLE OF CHINA
DESCRIPTION OF THE ADMINISTRATION OF THE SALT TAX AND ADMINISTRATION OF THE SALT INDUSTRY
THE SHORT CUT TO PEKING
PHILIPPINE MINING POSSIBILITIES
NOMENCLATURE ON CHINESE RAILWAYS
CAPITAL VALUES IN AMERICA
CHINWANGTAO AND ITS FUTURE OUTLOOK
MINERAL RESOURCES OF THE PHILIPPINES
FORMOSAN PUBLIC WORKS
HONGKONG'S NEW POST OFFICE
CHINA'S FINANCES
THE RAILWAYS OF CHOSEN (KOREA)
LOCOMOTIVES
PHILIPPINES PORT WORKS
FAR EASTERN RAILWAYS
PERSONAL
INSURANCE
TRAMWAYS
COMPANIES
ROADS AND BRIDGES
MINING
ETC., ETC.
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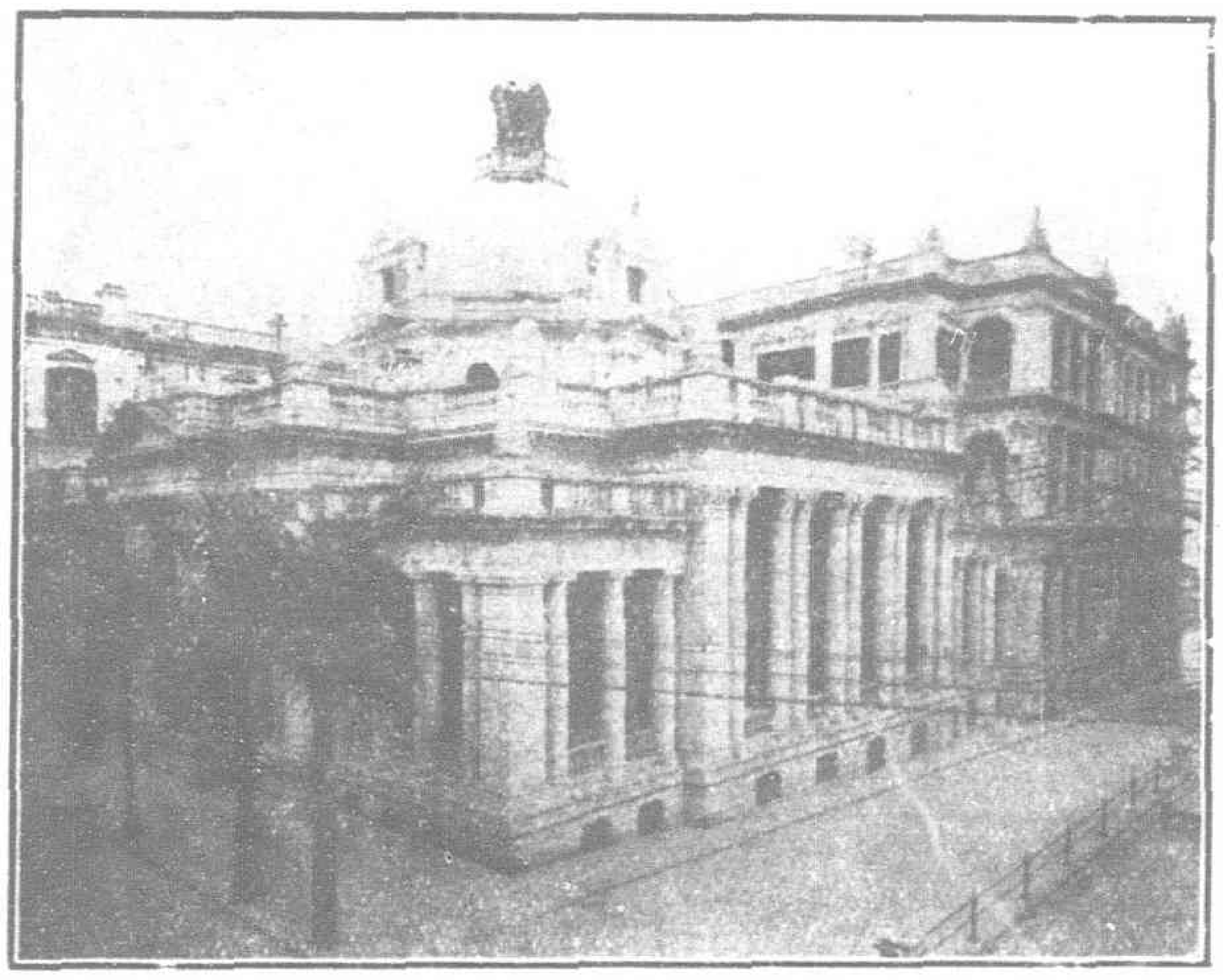

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THE FAR EASTERN REVIEW

COMMERCE :-: ENGINEERING :-: FINANCE

Vol. IX. SHANGHAI AND MANILA, DECEMBER, 1912 No. 7

THE SALT GABELLE OF CHINA

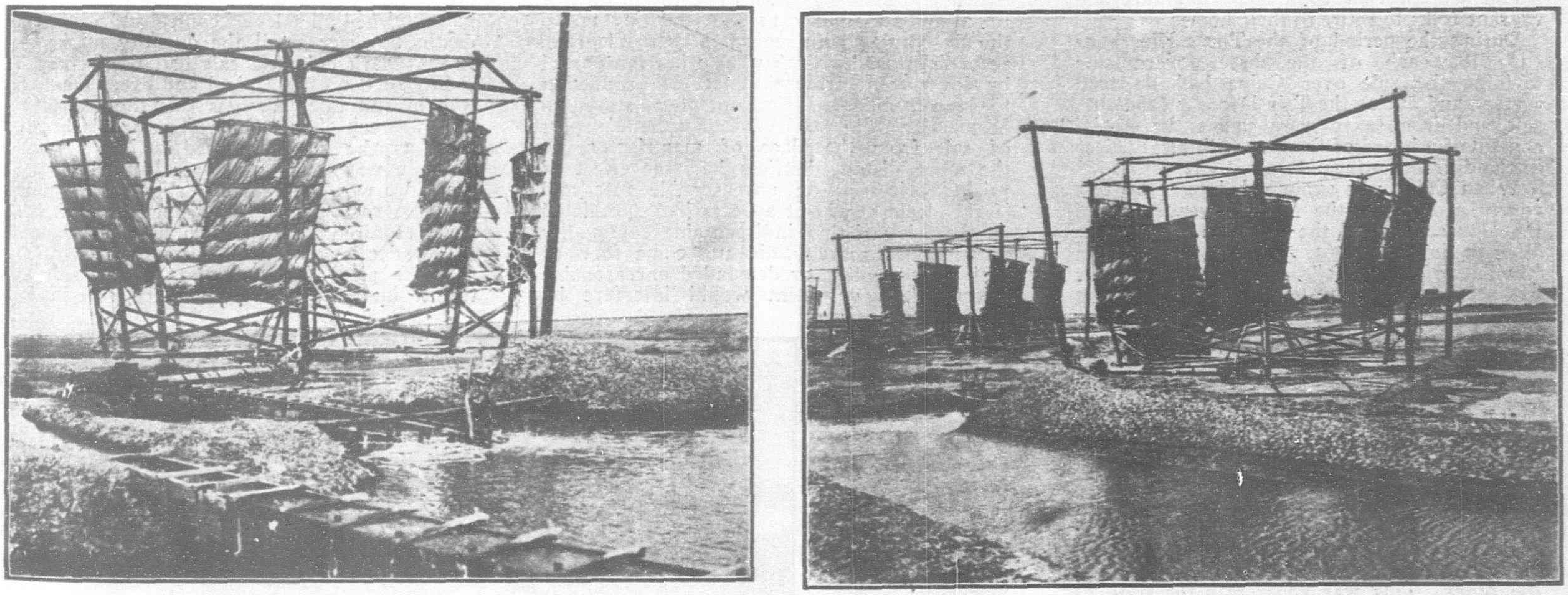
DESCRIPTION OF THE ADMINISTRATION OF THE SALT TAX AND ADMINISTRATION OF THE SALT INDUSTRY

So much has been heard of, and so little is generally known about the Salt Gabelle which has figured so conspicuously in the recent loan discussions, that there seems justification for the publication at this stage of illustrative facts connected with this most interesting of China's industries and sources of taxation. In China the history of salt taxation may be said to represent the principal features in the history of political economy generally.

Taxation of salt commenced as far back as the seventh century B.C., and the earliest mention of the commodity as in the annals of the great Emperor Yu (B.C. 2205-2197) who once ordered the province of Chingchou, which corresponds to the present Shantung, to supply the Court with, among other things, salt. During the Chow dynasty (B.C. 1122-249) officers were appointed for the administration of salt matters, and the *yen jen*, or "salt men," are mentioned in a list of the Court officials during that period, though later times saw them degenerate from palace functionaries to butchers, tailors, and shoemakers.

The Kuan Chung, a celebrated statesman, who died B.C. 645, must go the credit for monopolising salt, though the word monopoly is somewhat inappropriate, since the Government does not engage directly in the manufacture of salt, and, except in Szechuan, does not concern itself immediately with its sale, but confines itself to a strict control of manufacture, transport, and sale. But from Kuan Chung's days it has been described as a Government monopoly, and he commenced taxation by levying upon the dealers an impost, being one, which he wisely enough reasoned, few consumers would escape. The monopoly thus introduced by Kuan Chung became the source of immense wealth collected in the little state of Chi, of which he was Prime Minister, and was the basis of a regular system of administration known as *yen-fa*, i.e., "the method of salt administration." There are no records to show that a similar system existed in other parts of the coast during the Chow dynasty, but it is on record that the revenue derived from the salt and iron monopolies had, during the Tsin Dynasty (B.C. 255 to 209), grown to about twenty times the amount gained during the Chow period.

There is reason to believe that the monopoly was abandoned during the reign of Kao-ti (B.C. 206-194), though it was reintroduced during the Han Dynasty, the revival being necessitated by the drain upon the treasury by the wars carried on by Emperor Wu-ti with the Hsiung-nu and other nations in Central Asia, and such costly expeditions as that of Chang Chien to the countries of the West. Two of the advisers of the great monarch developed the system, and among the penalties for boiling salt with implements and vessels belonging to the Government was one providing for the chaining of the culprit by the left foot and the confiscation of his vessels and implements. Salt inspectors were then created. Popular feeling did not, of course, exhibit itself in favour of a continuance of taxation of such a necessary commodity as salt, and when the wars had been forgotten agitation for remission of the salt and iron taxes developed and continued, though the Government remained deaf for a century to the complaints that the poorer classes had "to work their fields with wooden ploughs and use their hands in lieu of weeding hooks because of the tax on iron, and live upon unsalted meals." Ultimately Emperor Yuan-ti (B.C. 48-33) suspended the taxes for three years, but the salt tax again came into prominence under Ming-ti, of the Eastern Han Dynasty (A.D. 55-76). Popular disapproval again thrived and Emperor Ho-ti (A.D. 89-106) eventually suspended the taxes and they were not reintroduced until near the end of the



WIND MILLS USED IN SALT MANUFACTURING

NOTE:—THE equivalent of the HAIKWAN TAEL, in which the Customs Revenue and all values are stated, was, during the July-September quarter, 1912, at the average Sight Exchange on London, New York, Paris, Berlin, Calcutta, Japan, and Hongkong respectively, as follows:—

English Money, 3s. 0$\frac{8}{16}$d.; American Money, $0.74; French Money *Francs* 3.84; German Money *Marks* 3.11; Indian Money *Rupees* 2.27; Japanese Money *Yen* 1.49; Mexican Dollars $1.51.

TABLE OF CHINESE WEIGHTS:—10 *Li* = 1 *Fen*, 10 *Fen* (CANDAREEN) = 1 *Ch'ien*, 10 *Ch'ien* (MACE) = 1 *Liang* = 583.3 grains (1⅓ oz. av.) 37.783 grammes. 16 *Liang* = 1 *Chin* 100 *Chin* (CATTY) = 1 *Tan* (PICUL) = 133⅓ lb, 60.453 kilogrammes.

Han Dynasty when in the Chien-an period (196-220) Commissioners were again introduced to control the sale of salt, on the plea that the proceeds were to be used to purchase buffaloes to be placed at the disposal of the people as an encouragement in agricultural labour with a view to induce emigrants and vagrant folks to retire to their homes.

During the period of the Three Kingdoms (220-618) each of the three governments dividing the rule over China had its own system, and during the Tsin Dynasty (265-420) salt and iron taxes were under the special control of a board of finances with local offices in the different principalities.

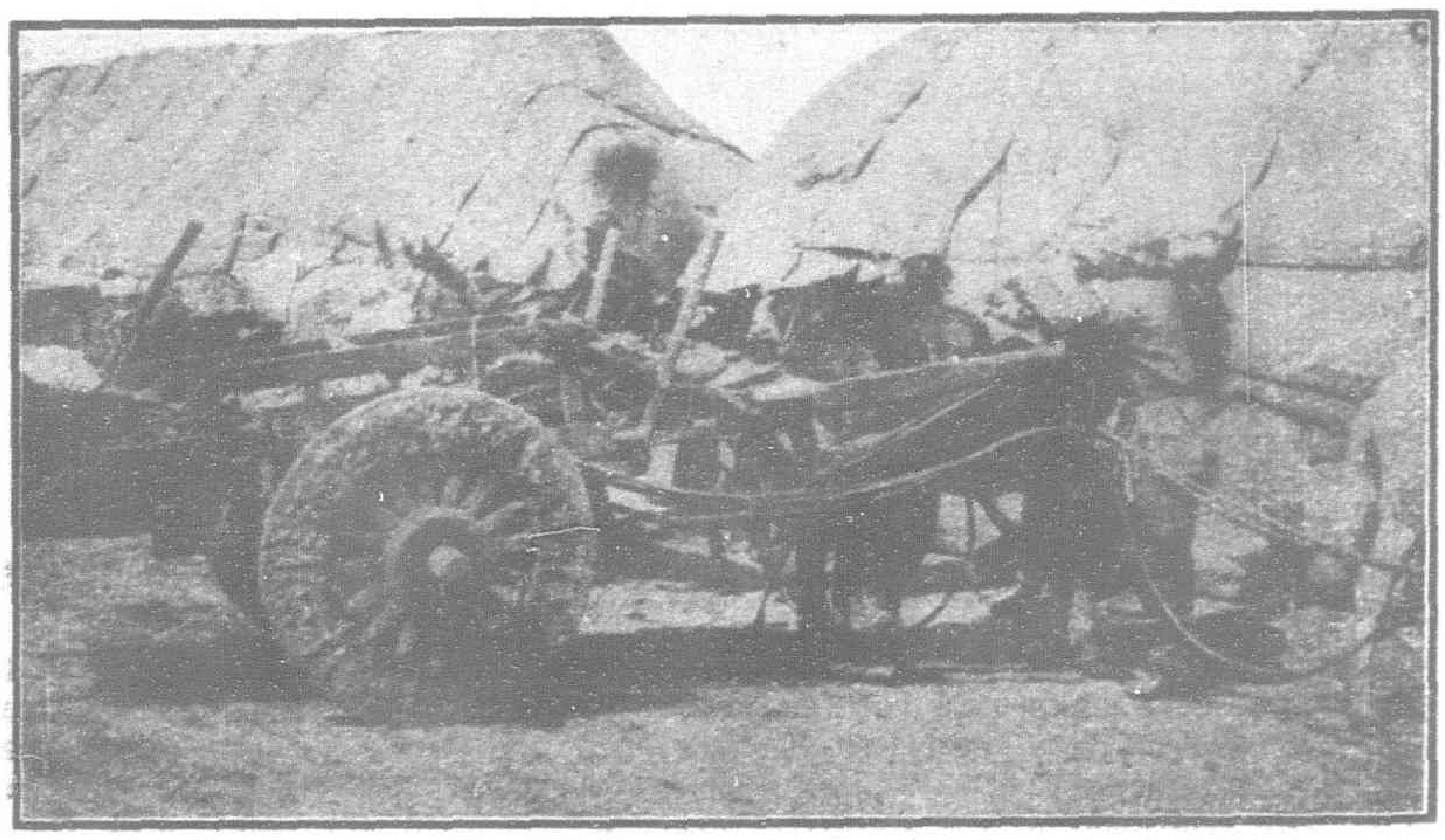
When China was again ruled over by two courts, a deficit in the public revenue caused the Government of the southern part under Wen-ti, in A.D. 561, to levy a tax upon "boiling of sea-salt;" and after the empire had been re-united, we find under the year 583 the record of an edict which places the free use of the "salt marshes," and of the "salt springs" at the disposal of the people. It seems doubtful whether the sea coast participated in this privilege.

During the first century of the Tang dynasty the monopoly was not enforced with much strictness. At the beginning of the eighth century it appears that great portions of the lower order of the population were without occupation, and that evil results threatened from insufficient production on the one hand and the imminent growth of proletarianism on the other. This was apparently the state of the empire in 713 when one of the Emperor's advisers, Liu Tung, made the proposal that menials and agriculturalists without occupation should be employed in salt and iron works; and after this the collection of taxes upon the salt-marshes, of which there were eight, of the salt springs, of which there were 640, and of the salt works in Yu-chou, the country about Peking, and in Tatung, in Shensi, and Heng-yeh, was placed under the control of the To-chih, or Board of Finances. A further change was brought about during the period Chien-an (758-760) when the Salt and Iron Tax Commissioner, Ti-yiu Chi, proposed that out of the unsettled population those who occupied themselves with the manufacture of salt should be styled *t'ing-hu* (cottars?), who were to do labour in salt works kept on government account, and therefore to be exempted from all other socage. Moreover, on transporting salt from place to place in the interior it a transit tax of ten per cent. was to be levied on the market price. Liu Yen, the great scholar and financial operator of that period, who in his turn held the post of a Salt and Iron Commissioner, became the originator of a system similar to that existing up to the present day with regard to rice and grain, according to which salt was to be transported by government from the place of production to the consuming districts and there stored up in quantity. The tax levied upon the transport of salt from the place of manufacture to the more distant districts had the effect of raising prices at an unreasonable rate, and if the dealers, who it appears had speculated on the price of this indispensable commodity in times of scarcity, did not come forward with their supplies, or demanded unreasonable prices, the government would interfere by selling their stock at a standard rate which could not be increased however distant from the producing district a place might be, or however unfavourable the conjunctures of the trade had become. The salt thus held ready for the market by government was styled "salt at never changing prices." When Liu Yen took charge of the finances the annual net proceeds of the gabelle amounted to $400,000 but by 780 A.D. they had risen to $6,000,000, about one half of the entire revenue of the empire.

VIEW OF TZELING A SALT CENTRE OF SZECHUAN PROVINCE

In A.D. 940, about the middle of the Five Dynasty period, salt was sold in small rolls called *t'san-yen*, from their likeness to cocoons, or in loose particles called *mo-yen*. In each salt district 170,000 strings worth were sold. A thousand cash weighed about six catties. Each householder might use in a year salt for which the duty was from a thousand to two hundred cash. Hawkers took the official salt to sell and this system was found to suit the Government and the people. The duty was levied on five different classes of consumers, those consuming salt taxable at either 200, 400, 600, 800, or 1,000 cash, and the amount was collected by the tax gatherer. Each knew how much he was to pay. This system was carried out by the Government for some time until it was discovered that a variation in the price of salt, determined by its proximity to or distance from the source of supply, compelled a reform which would prevent tax collectors obtaining more than a regular profit. A uniform duty of seven cash a catty was then levied on hawkers and ten cash on resident householders. The high authorities of each province and prefecture sent officers round to correct errors and redress grievances, but public dissatisfaction could not be avoided. To diminish this sense of wrong ten cash were subtracted from each *tow*, or a hundred from each picul.

The Lieu family gave place to the Ts'ai family, and the Emperor of this family fixed upon the title Kwang-shun in 951, and in the autumn of the same year issued an edict on salt. Death was the penalty for selling unrefined salt for any quantity beyond five catties or six and two-thirds English pounds. If the salt was refined, one catty and upwards sold rendered the seller liable to the death penalty. This rule was intended to be a step in the direction of leniency, for the preceding dynasty, which lasted only four years, had punished all sales of contraband salt with death, however small the quantity might be. In 953 dark coloured salt had been charged a duty of 800 cash a picul and every hundred was in full tale. Besides this the tribute in kind was ten pints. On white salt (dark salt, such as the sea salt used at Peking and Tientsin was much stronger than white, and therefore was charged higher duty) the duty was 500 cash a picul, and five pints of salt were required as tribute in kind. The new rule was to levy a duty of 1,000 cash on *t'sing* salt per picul with ten pints of the salt as tribute in kind. Still complaints were made, and the addition was objected to. It was settled that the good salt should be liable to a duty of 800 cash, and eighty-five were to count as a hundred, so that the actual payment was 680 cash a picul. Ten pints of salt were required. On the inferior white salt the duty exacted was 500 cash a picul and five pints in kind.



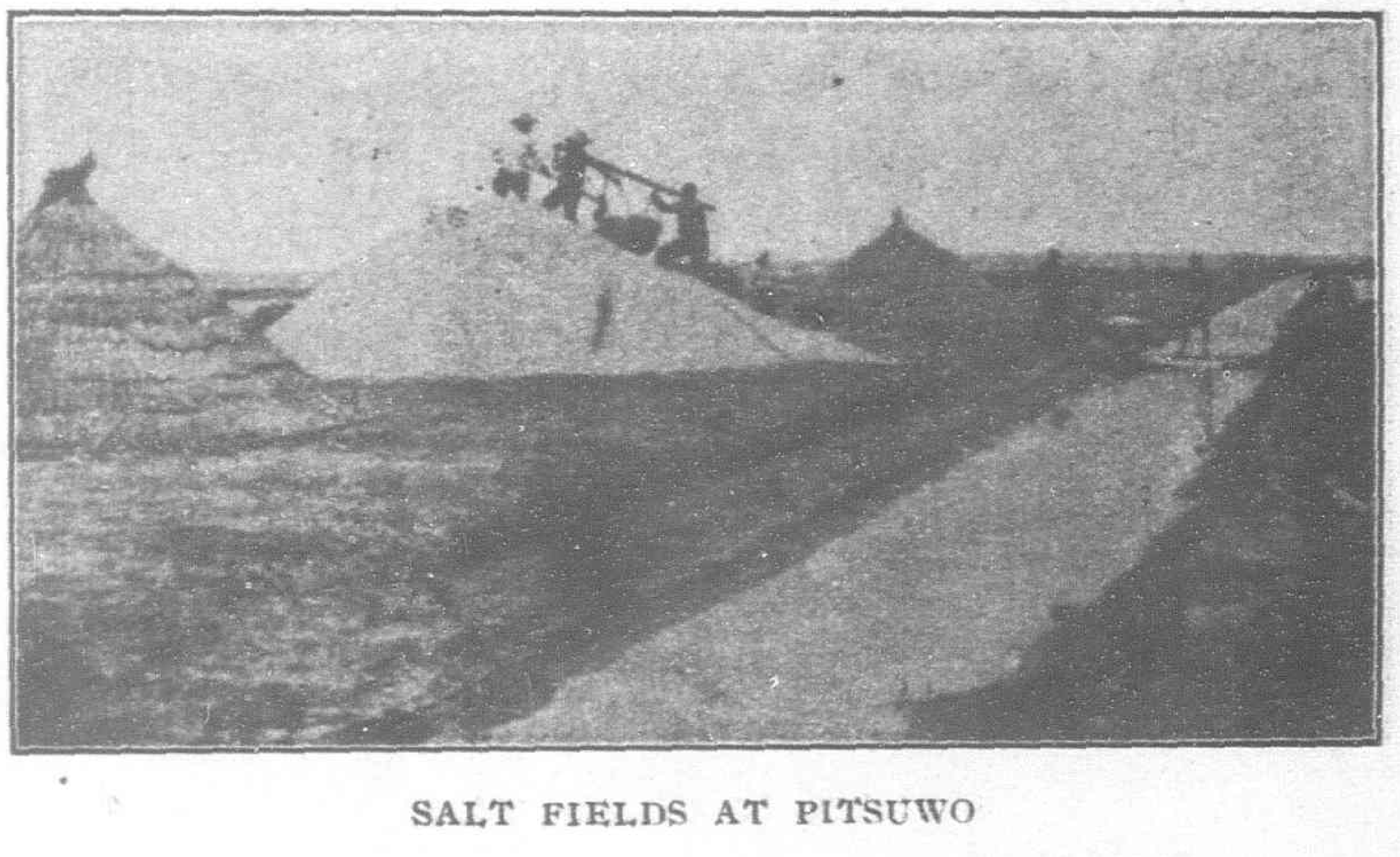
HEAPS OF PREPARED SALT

In A.D. 954 the late Chow Emperor, with the object of preventing smuggling, established a district of ten cities for the circulation of official salt (that in small cubes), the population on the west of Ts'au-chow-fu and the Sung region in Honan, including about ten cities, being supplied with cube salt. In 956, in November, it was made a law that north of the Chang river, in Chihli, in cities and markets as before, only official salt should be sold, but in villages salt was allowed to be sold on freetrade principles. Wherever salt and soda were mixed in the soil the people were allowed to carry it away to sell, but they were prohibited from trespassing upon those districts where official salt only was allowed to be sold.

Succeeding Emperors always found that salt was the most productive article of consumption to tax, and varied the systems according to their particular ideas of the method most likely to produce the best result with the least friction, though the populace continued periodically to voice their complaints and objections. Despite this, however, the market value of a certificate increased from 65,000 cash to 150,000 cash between the years 1296 and 1315.

The Modern Administration

When we come to our own time we find the conditions similar in many respects to what they were one or two centuries ago. The collection of the tax differs in various provinces, but always it is veiled in more or less obscurity, or is portion of an intricate system of monopoly—mortgaging by firms or families whose forefathers originally secured the right to first farm the salt-tax collecting rights. This is one of the strong reasons advanced why the Salt Gabelle could never be reformed by foreigners or administered as is the maritime customs. We have it on the authority of the Commissioner of Customs at Hankow that there are some 42 different taxations under sundry government, charitable, and other names imposed on salt before it can be brought to the consumer, in Hupeh province. The Commissioner of Customs at Yochow says that prior to the Taiping Rebellion the supplying of the districts in Hunan province which took Yuch salt was a monopoly in the hands of two rich Hunanese firms. The Taipings caused the complete collapse of the monopoly and it never revived. The next system was one of licensed salt shops, with *fan-shang*, or conveying merchants, who brought to them the salt from Kwangtung for retail sale to the people. The shops obtained their license from the Provincial Treasurer, its cost, including squeezes of all kinds to yamen underlings being about 400,000 cash (Taels 365).



SALT FIELDS AT PITSUWO

In Shantung the Government farms the right to produce and manufacture salt to six resident firms who refarm it to contractors. The obligation of the resident firms is to supervise the contractors, make contracts, and collect taxes which they send to the Salt Controller.

In Manchuria it is open for anyone rich enough to buy a site to establish a salt pan. The payment of the price, which varies according to position, from Taels 100 to Taels 500, constitutes the site "property in perpetuity." The only taxes on salt in Manchuria are an annual tribute of 1 *tan* 5 *tou* per salt pan to the Imperial Household at Mukden and the tax of 7,200 *tiao* (about Taels 0.80) per tan (600 catties) on salt sold from the pans. There are in total about 3,600 salt pans along the coast of Fengtien, the low-lying flats which extend to the south of Yinkow for nearly 20 miles being one continuous field of salt-pans.

The province of Kwangsi is divided into salt administrative districts which constitute two monopolies. One, which has its centre at Wuchow, includes the Fu River Valley up to Kweilin and Chuan-chou, near the Hunan border, and is known as the Lin-chuan Fou; the other which with centre at Wuchow, takes in the West River up to Hsunchow and beyond, up the Liu River to Liuchow, and the district around Ching-yuan, is called the Ta-chiang Fu. The right to include the West River up to Nanning is contained in this latter monopoly, but is seldom availed of. Previous to the reign of the Emperor Hsien Feng the purveyance of salt to Kwangsi was farmed out in its entirety to monopolists, who were called simply *fou-shang*, on the principle of "conveyed to traders and disposed of by traders." The Taiping Rebellion, however, in that reign proved so disastrous to trade and to order that the monopolists were unable to pay the taxes due to the government, or provide the salt. A change was made, the government took over the charge of collecting the taxes, but farmed out the right to import the salt. The highest bidder presumably receives the monopoly, the terms of which are arranged with the Salt Commissioner for the Two Kwang in Canton. The monopolist is bound to import not less than 238,000 bags of salt a year and pay the taxes on the same, and of this for the Fu River districts Ta-ching Fu, the minimum is 120,000 bags; this quantity constitutes *kuan-yin*, or official permit salt. But the monopolist is of course permitted to import more salt, if he so requires, and for which he receives the usual permits—such extra quantities being called *kuo-ngo* or *mgo-wai*, In addition to the above there may happen to be, and it is generally to the monopolist's advantage that there should be, salt remaining unsold from year to year; such salt is called *chi-yin*, is subject to a reduced duty payment, is sold through a special hong, and in retail quantities. The quantities of *kuo-ngo* and *chi-yin* salt depends on many considerations, not the least of which is the success of the salt smugglers; the less smuggled salt there is the more legal salt is required and the more the monopolist benefits.

With a view to presenting some adequate idea of the actual operation of the Government control of salt in widely separated provinces we include some facts about the operation in Szechuan province and the Hwai administration, the two largest sources of supply in the country, and the conditions described in the Hwai Administration are prevalent in all.

The Szechuan System

The now famous salt wells of Szechuan were not discovered until somewhere about A.D. 249, or at least records contain no mention of them before that date. In that year a well was opened in the south of the present Cheng-tu district, the opening being ascribed to Governor Li Ping who seems to have done more than anyone else to develop the resources of the province, and to this day he is worshipped as its special patron saint. The Government made a monopoly of the evaporating pans and ovens, and a law forbade the clandestine manufacture of salt, the penalty being the confiscation of the implements used besides the cutting off of the big toe of every offender. The pans and ovens were rented out to those desirous of manufacturing in return for a proportion of the yield, which was the original and earliest form of well tax.

In the T'ang dynasty the monopoly of pans and ovens was given up—manufacturers providing these for themselves—but a well-tax was levied instead, which was regulated by the annual output. The wells then numbered 641, and the manufactured article was allowed free circulation. Early in the Sung dynasty a special high officer was created for the administration of the tea and salt trades, and in 1001 the province was first divided into four circuits each under a superintendent of trade, which, being collectively known as Ssu-ch'uan-lu, gave the province its present name. During this time the term *yin*, meaning a permit or pass, was first used in connection with the salt industry, and has been conspicuous in all subsequent codes of regulations. In 992, during the war on the northern frontiers supplies for the army were paid for in *yin* for surplus salt from the great salt districts in the Eastern provinces. This irregular system soon became an approved system of taxation and as such it was introduced in Szechuan in 1132. Two taxes on the one article came into operation at the one time—one on the wells, the other on the purchaser.

The system continued through the Yuan dynasty, and during the Ming dynasty the control became much stricter and a complicated official apparatus was created for the purpose. After the accession of the Manchu dynasty the supreme control of the gabelle was vested in the Government.

In 1877 what is known as the Government transport system was introduced, the principle upon which it is based being that while leaving the production and ultimate production to private enterprise the government, in order to insure the distribution in every direction, undertook the conveyance. It purchased the salt at the wells, transported it to destination, or to central depots, and there sold it to the trade at a figure which included all charges for prime cost transport, duty, etc. Permission was first granted to give the system a trial at Kweichou and, on its being found entirely successful, it was extended to Yunnan, to the eight districts of Hupeh drawing salt from Szechuan and to 33 districts of the province itself,

There were actually three different systems working side by side in Szechuan province alone, and methods differed in other provinces. One was the allotment system, another was the incorporation of the salt tax in the poll tax, and the third the government transport system above referred to. This, if honestly carried out, was calculated to satisfy best the requirements of both the revenue and the public. It approaches to a certain extent the idea of a salt monopoly, but is not inasmuch as the Government occupies itself nowise with either the manufacture or ultimate sale of the product. In 1882 there were 40 districts in Szechuan producing salt in greater or less quantity. The salt-wells numbered 8,830, the "fire-wells" (described at a later stage) 10; the ovens 1,484; the evaporating pans 5.527; and the "hot water" pans 238. The regular supply for which permits were issued and the distribution of which was regulated by definite rules was nominally piculs 2,061,816, actually piculs 2,371,088 and more. This is called *yin yen*, in contradistinction to the *yu yen*, or surplus salt, which is subject only to likin charges en route to distribution.

For the regular supply of salt the permits are issued by the Board of Revenue and transmitted to the Governor-General as the responsible head of the Salt Administration. The permits are distinguished as regular permits and reserve permits. The latter to the number of 5,000 are retained by the Governor-General as a reserve stock to be drawn on in the event of any district applying for an increased allotment. In Szechuan 104 out of the 137 districts are under the control, for salt tax purposes, of the Salt Commissioner. The system of administration is mainly the same as inaugurated in 1732. In 42 districts, however, mostly in the north of the province the salt tax is collected simultaneously with the poll tax now amalgamated with the land tax. The permits are retained by the Salt Commissioner and the districts concerned depend for their supply on the surplus salt purchasable in small quantities at the nearest salt wells. In the remaining 62 districts the permits are handed to the territorial officials according to fixed allotment and these act as collectors of the salt tax. They again distribute them among a number of resident firms who have obtained the privilege against heavy guarantees. And in their turn these merchants invite other companies to contract for the conveyance of the produce to destination. On arrival there a statement of original cost, transport expenses, etc.. is submitted to the magistrate who proceeds to collect the charges due, and, adding 4 cash per catty for the merchants' profit, fixes the price of salt accordingly by proclamation. At the end of the year the permits, together with the dues collected, are supposed to be surrendered to the Salt Commissioner who forwards them to the provincial capital with his return. The permits are eventually returned to Peking and the revenue is either remitted or otherwise accounted for.

The head office of the Government Salt Transport is at Lu-chou and is under the direction of a general manager. Branch offices are established at various places where salt is stored pending shipment. From the branch offices it is transported to the depots at destination and sold to the trader. The permits which have accompanied the produce thus far are returned to the head office and *hu-chao* issued to protect the goods to their ultimate places of consumption.

The surplus salt of those districts which contribute to the regular supply taxed by the officials established in the districts, and after being freed, may be conveyed to any market subject only to likin duty en route, but no applicant is granted a pass for more than 80 catties at one time.

The actual heads under which taxation is levied in Szechuan are:

(*a*) *Well Tax.* The productivity of a well is assessed after it has been working three years, and graded into first, second, or third class. There is no fixed scale of taxation, but once assessed the tax remains the same year after year.

(*b*) *Regular Salt Tax,* calculated on the old basis of Taels 0.0681 per picul, or Taels 3.405 per River Permit and Taels 0.2724 per Land permit.

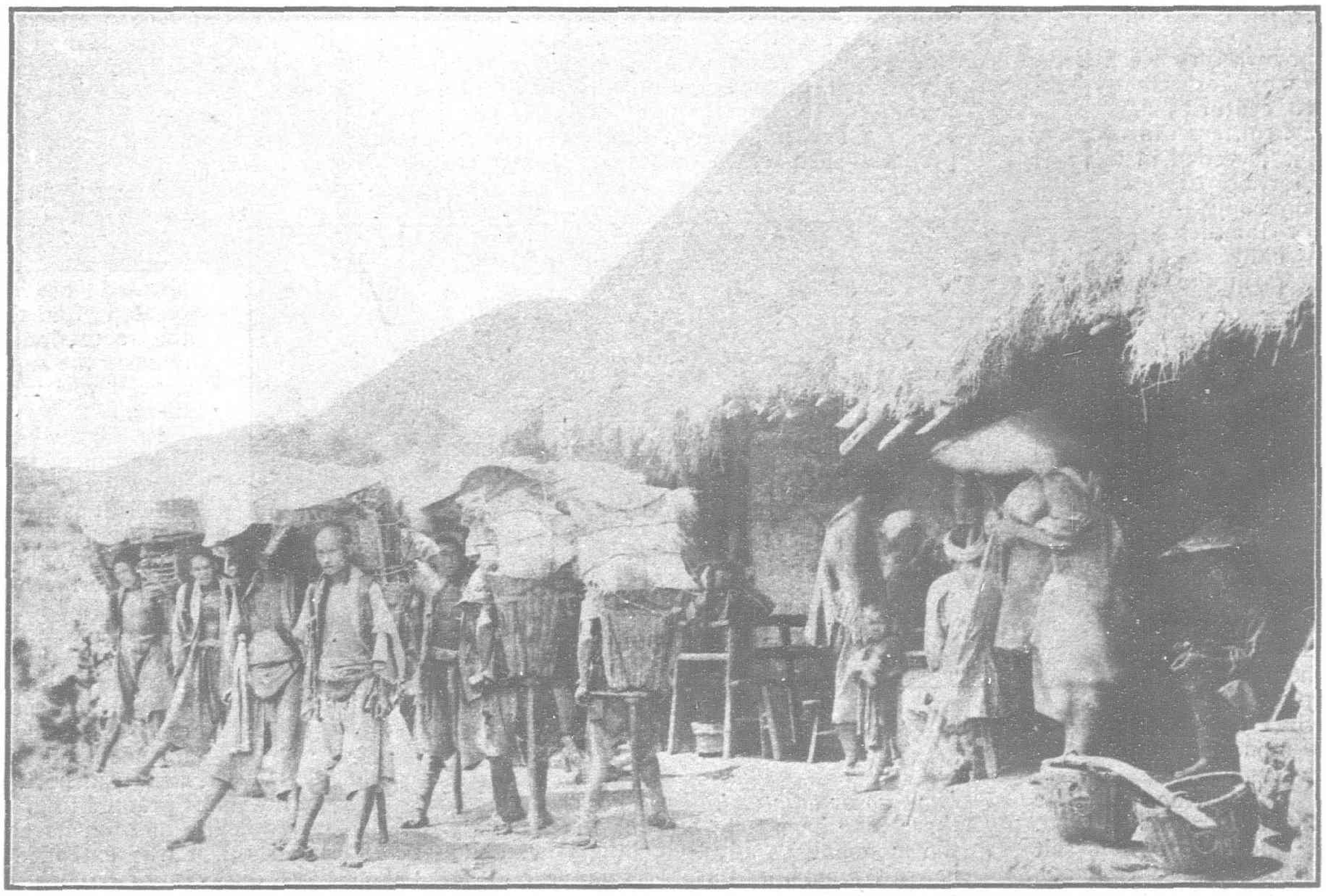
(*c*) *Remittance Tax,* providing for expenditure connected with the printing of the permits and their remittance every year from and to the Board of Revenue in Peking. Three mace are charged per 100 permits for the cost of printing and 4 *li* per permit for cost of remittance.

(*d*) *Examination fee,* intended, originally for barrier expenses. It amounts to 6 mace per river and 48 *li* per land permit, if for Szechuan or Hupei, and to one tael per river and 80 *li* per land permit, if for Yunnan or Kweichow.

(*e*) *Overcharge,* for cost of administration. This is collected both on the well tax and on the salt tax proper. It varies in different districts but remains the same from year to year.

The taxes (*a*) to (*c*) represent the original salt revenue due to the Central Government, (*d*) and (*e*) were formerly illegal charges, the amounts of which varied in different places, but have since been submitted to the Board and approved of. All have now become fixed assessments, (*a*) to (*c*) being annually remitted to Peking, (*d*) and (*e*) retained in the province, but reported and accounted for.

It is contended that the salt tax from the whole revenue of Szechuan may be estimated at Taels 2,000,000. Apart from the remittances for Peking it is mainly appropriated for the maintanance of the military, for subsidies to the administrations of Yunnan and Kweichow, which are not yet self-supporting, and in later years also for contributions to the coast defence.



SALT CARRIERS AT A LIKIN STATION, IN KWEICHOW PROVINCE

THE HWAI ADMINISTRATION.

The Hwai Administration, supplies about 100,000,000 of the population, and is perhaps the most important of the Salt areas into which the country was divided. The Governor-General at Nanking is the direct head, and under him is an army of controllers, agents, guards, etc., echelonned along and on both sides of the Yangtsze, charged with control of the traffic, prevention of smuggling and levy of taxes. Production, transport, and sale are in private hands, under licenses issued by the Administration. From the vats to the depots (the principal one being above and opposite Chinkiang) the salt is practically in bond. At the depot the salt is bought, at a price fixed by the Administration, by the holders of licenses; of these a fixed number, usually 300 to 400 to each province, have been issued against a capital payment which, if there were a demand for further issue now, would be Taels 10,000 to Taels 12,000 each. The licensees take their turn, which may be once in two years or twice in three years according to circumstances, and in his turn each is permitted to buy 3,750 piculs of salt.

In order to evade the difficulties caused by different regulations and customs on every route, different weights at short distances, and different taxes in different provinces, it is necessary to select one province, and Hupeh will be assumed to be the destination. The cost of production is Taels 1,130 for this quantity in which is included the vat licence fee and transport to the depot; and the price paid at the depot is Taels 3,725, giving Taels 2,595 for Government charges for storage, and taxation to this point. The transport to Hupeh is controlled from point to point and on arrival the salt is stored in one of the provincial depots, paying storage and awaiting its turn to be sold to the licensed shops, conveyance to which is also controlled. There are numerous changes of scale, changes in the method of accounting, delays to be avoided and difficulties to be smoothed away, which add to the cost of the salt, and to the emoluments of the Administration agents, and contribute nothing to the revenue but which must all be paid for by the Customs; and merely to enumerate the different items of taxation and adequately describe the application of an exceedingly complicated system would require a chapter to itself. It is sufficient to say that the regular officially recognised taxation from the depot near Chinkiang to issue from the provincial depot at Hankow is put by good authority at Taels 1.60, and a little more per picul. To get at what the people pay we need only take the retail price which is fixed by the Salt Administration. In Hupeh about 1898 the average retail price so fixed was fifty cash per catty; as the corresponding price in Hunan was fifty-six cash, and as those were the prices before the increase in taxation to meet the Boxer indemnities; this price of fifty cash may be accepted as a fair average. Converting at the same rates, the producers cost of Taels 1,130 for the quantity of 3,750 piculs, under one license, is increased to Taels 12,545, as the price to the consumer, the difference being Taels 11,415; if Taels 1,415 be allowed for cost of transport and legitimate profit the remaining Taels 10,000, (Taels 2.67 a picul) is paid by the people as tax regular or irregular, open or covert.

PUMPING BRINE FROM LIGHTERS AT FUCHOW, SZECHUAN

Under the recent regime the country was divided, for productive, administrative, and descriptive purposes, into eleven salt areas, the salt from one not being permitted entry to another. On the receipt of licenses the farmers are required to give a bond that the salt shall be sold only in the district named by the Government; non-observance of this rule entails prosecution and confiscation of their stock of salt. At the same time the fixed rate is given them at which they are to conduct the sales. These rates are not the same everywhere, but lower for the districts in the neighbourhood of the salt works, and higher in proportion as the distance from them increases.

The monopoly was thus conducted and controlled for a considerable period. The areas were:

1.—Shengking: sea salt, supplying Manchuria.

2.—Chang-lu (Long Reed): sea salt, supplying Chihli and the northern part of Honan.

3.—Ho-tung ("East of the Yellow River"): lake salt, supplying Shansi, the western part of Honan, and the south-eastern part of Shensi.

4.—Hwa-ma-chih ("Piebald Horse pool"): lake salt supplying Mongolia, Kansu, and the greater part of Shensi.

5.—Shantung: sea salt supplying Shantung and corners of Honan, Anhwei, and Kiangsu.

6.—Hwai: sea salt, for administrative and distributive purposes divided into:

6a.—Northern Hwai, supplying the northern part of Kiangse north of the Yangtsze, the northern part of Anhwei, and the southern part of Honan.

6b.—Southern Hwai, supplying the southern part of Kiangsu north of the Yangtsze and Nanking south of the Yangtsze, the southern part of Anhwei, the northern part of Kiangsu, the eastern part of Hupeh, and the greater part of Hunan.

7.—Szechuan: well salt, supplying Szechuan, the north east corner of Yunnan, nearly all of Kweichow, a corner of Hunan, and the western part of Hupeh.

8.—Yunnan: well salt, supplying all Yunnan except the north-east and south-east corners.

9.—Chekiang: sea salt, supplying Chekiang, Kiangsu south of the Yangtze (except Nanking), and corner of Anhwei and Kiangsu.

10.—Fukien: sea salt supplying Fukien except the south-west corner.

11.—Kwangtung: sea salt, supplying Kwangtung, Kwangsi, the northern part of Kwangsi, and small corners of Fukien, Hunan, Kweichow, and Yunnan. A twelfth, self-supplying and consuming, area of small dimensions in central Hupeh need not be considered.

During the tenure of office of Duke Tsai-tze as Minister of Finance before the abdication of the Manchu Dynasty these eleven districts were consolidated into eight, namely: Manchuria; Changlu, including part of Honan, with headquarters at Tientsin; Shantung; the two Hwai, with headquarters at Nanking; the two Che, with headquarters at Chekiang; Fukien; the two Kwang; and Szechuan.

Revenue Derived from the Gabelle

A statement of the utmost interest as to the revenue derivable from the Salt Gabelle was prepared in July 1912, and published for private circulation by Messrs. Masnoske Odagiri and Kokichi Midzuno, the former being the Japanese representative in the Six Power Banking Group, and the latter being the First Secretary of the Japanese Legation at Peking. They point out that in the early ages of the Manchu Dynasty, reports on revenue from the Provinces to the Central Government, only showed the net income to the Central Government, and the expense of collection, which amounted usually to about ten per cent. (in some localities up to twenty per cent.) was not reported. This expense of collection the provincial authorities were allowed to levy on the people, in addition to the ordinary taxes and other impositions. Thus figures quoted from the Ta Ch'ing Hui Tien based on provincial reports naturally show the net income of the Central Government, expenses of collection having been previously deducted by the local authorities. Since the Taiping rebellion administrative expenses of the provincial goverments have enormously increased and the Viceroys and Governors have, with the sanction of the Central Government, imposed new likin and contributions and used them for provincial administration, reporting or without reporting them to the Central Government. When the new state of affairs necessitated the compilation of a budget on modern lines a thorough investigation of provincial impositions of every description, as well as the aforesaid expense of collection, was made by the officials sent out by the Central Government for that purpose. The Central Government, compiled the budget for the third year of Hsuan-tung, 1911, based on reports of those officials. Hence the sudden and enormous swelling of the budget. The budget for 1911 when first published was not free from some ambiguity, for instance: in the revenue, salt and tea taxes were not separated, and they figured at Taels 47,000,000, but the gross profits of the Government transportation service was not included. In the expenditure, expenses of collection of salt and tea taxes were not separated, but were put down together with the expense of collection of other revenues. But a later revision added some Taels 6,000,000 for the Government transportation service, and separated the Taels 2,000,000 derived from the tea tax and placed the working expenses of the salt gabelle at Taels 8,000,000. The budget for 1912 shows some improvement, having set apart the Salt Gabelle revenue from the tea tax and detailed the items of expenditure of all the officers of the Gabelle.

Most, or rather all, of the Occidental authorities on the Salt revenue have invariably placed the total net revenue at about Taels 13,000,000. There having been no other available figures than reports of provincial Viceroys and Governors their calculations are apparently and necessarily based thereon. The budget for 1912 is most reliable for practical purposes.

Increase of Salt Likin and Surtaxes—The only reliable figures available about Salt Likin in the early Kuang-su era are those of the thirteenth year of Kuang-su (1887) which were, according to the Ta Ch'ing Hui Tien, Taels 4,001,747 and 2,417,980 strings of copper cash. When these figures are compared with those of the current year (1912) i.e., Taels 9,019,352, a very significant increase is noticeable.

Although surtaxes such as those of Chang-lu (Chihli) and Shantung for works of the Grand Canal, repairs of the Yellow River, etc., were not infrequent, even prior to the Kuang-su era, yet such advances, so far as records go, were not very remarkable. After the accession to the Throne of the Emperor Kuang-su, especially since the Boxer trouble, increases in surtax have become frequent and enormous. The following joint memorial, dated the 23rd day of the seventh moon, of the third year of Hsuan-tung (1911) of the Central Salt Gabelle Office, and the Department of Finance, speaks for itself. "Troubles since the early years of Kuang-su have necessitated advances in the surtax to save the country from calamity, viz: surtax for rations and salary, (Army); surtax for drill, (Army); surtax for River Defence, Yangtsze, (Navy); surtax for coast defence, (Peiyang Squadron); surtax for new indemnity, (Boxer trouble); surtax to supplement opium duties, dues, etc., (four cash per catty since the year 34th Kuang-su, 1908, to supplement deficit of opium revenue); surtax for Yao Cheng K'ou Chen, (new administration); surtax for building war vessels (two cash per catty in Hupeh since the sixth moon of 34th year of Kuang-su, 1908); surtax for railways, Hunan, Honan, Chihli, etc., (four cash per catty in Honan since the first year of Hsuang T'ung, (1908) in Chihli, the sixth moon of the same year.) Some of these surtaxes were made universal all over the country by the Department of Finance, others were imposed by provincial manifestoes. The more the necessity the more pretexts and newer ways and means of levying, and the surtaxes have advanced invariably in all provinces until in some provinces they reach twenty cash per catty. This state of affairs is from a financial point of view an inequality and from the people's standpoint an uneven burden. In Hunan the surtax was increased ten times since the tenth year of Kuang-su (1884), which amounted to 26 cash per catty." The foregoing Memorial shows how frequent and radical the increases of surtaxes have been in recent years.

According to the Memorial of the Department of Finance of the fifth moon of the 34th year of Kuang-su (1908) an increase of surtax by four cash per catty would realise an additional revenue of four to five million taels. One cash per catty, therefore, means, roughly speaking, Taels 1,000,000 to Taels 1,250,000 to the Fiscus.

The *Official Gazette*, dated the 6th day of the 12th moon of the 34th year of Kuang-su (1909), throws a side-light on these figures when it publishes a memorial by the Viceroy of Chihli, in which he states that the proposed increase of surtax four cash per catty of Chang-lu salt (Chihli province), shall be contracted at one tael two mace per *yin* (license, which in the case at Chang-lu, covers about 600 catties, whereas the average throughout China Proper is about 540, and means therefore one tael eight candareens per *yin*). The total issue of *yin* in the seventeenth year of Kuang-su (1891), is, according to the Ta Ching Hui Tien, 4,180,000 pieces per annum in China Proper. Therefore, including the consumption of salt in Manchuria, etc., to the aforesaid figures for China Proper (making an addition of ten per cent. in consideration of the fact that the salt revenue of Manchuria represents about one-tenth of that of the whole country, according to the published budgets) we arrive at the following figures: 4,180,000, plus 418,000, a total of 4,598,000 multiplied by 1.08, equals Taels 4,965,840,000, 4,965,840 divided by four shows an increase of Taels 1,240,000 at one cash per catty, which is very close to the aforesaid estimate of the Department of Finance. If the increase of Salt Surtax in the whole country since the first year of Kuang-su can be estimated at fifteen cash per catty the total increase thereby of revenue will be approximately Taels 18,000,000. This proves that the Budget for 1912, which estimates an increase of surtax of Taels 17,317,000, is not far from being accurate.

The following amounts are those representing the receipts by the Central Government at various periods from 1753:

	Year		*Fiscal Income*
Ch'ien Lung,	18th year (1753)	Tls.	7,014,941
Chia Ch'ing,	5th ,, (1800)	,,	8,081,517

In these old times, there was no Likin.

Kuang Su,	15th year (1889)	Tls.	7,716,272
do.	17th ,, (1891)	,,	7,398,799

(NOTE:—According to the Ta Ch'ing Hui Tien, grand total of provincial Salt Likin of the 13th year of Kuang Su, 1887, is Tls. 4,001,747 and Strings of Copper Cash 2.417,980).

Kuang Su,	19th year (1893)	Tls.	7,679,828

(NOTE:—The three foregoing figures do not include the income from Likin).

Kuang Su,	20th year (1894)	Tls.	13,000,000
do.	23rd ,, (1897)	,,	13,659,000
do.	24th ,, (1898)	,,	12,600,000
do.	29th ,, (1903)	,,	11,269,865
and Strings of Copper Cash			2,240,044
Kuang Su,	32nd year (1906)	Tls.	12,951,000

(NOTE:—The five foregoing figures include the income from Likin).

Hsuan T'ung,	3rd year of 13 months (1911)	Tls,	51,903,780
do.	4th year (1912)	,,	47,575,486

From the above table it will be seen that the Budget for 1912 shows an increase of 600% compared with the time when there was no Likin, and about 350% over even that of 20 years ago, which included Likin.

Increase of the Salt Gabelle Revenue in three Eastern Provinces:—Of all the provinces of China the Three Eastern Provinces are most conspicious in the increase of salt revenue. According to the Ta Ching Hui Tien in the 13th year of Kuang-su (1887), the income of Salt Likin of Fengtien province was only Tls. 210,000, while recent returns show that the total Salt Likin, etc., of that province amount to Tls. 1,600,000.

As to the Government Transportation Service, etc., of salt in Kirin and Heilungkiang, the Ta Ching Hui Tien does not show any income in that category, but according to the latest budget, these two provinces pay to the Fiscus about Tls, 2,800,000 as the income of the Government Transportation Service of Salt, etc.

These are only two of the many instances of very extensive and radical increase of revenue on salt, made possible by the improvements on and progress of the three Provinces in the past twenty years.

Increase of Revenue by Reorganization.—It cannot be denied that the Salt Gabelle revenue will be materially increased if the whole system be reorganized, and smuggling and unauthorized manufacturing of salt be suppressed, and the prevailing corruption could be done away.

Mr. Hsiung Hsi Ling, ex-Minister of Finance, estimates China's population at 420,000,000 and at 13 catties per capita annually, he calculates the annual consumption of salt at 54,600,000 piculs, the total income of the Salt Gabelle being $109,000,000 at $2 per picul.

As these figures are apparently doubtful, it may be safe to figure China's population at 250,000,000, and the annual consumption of salt at 32,500,000 piculs.

So far as Messrs. Odagiri and Midzuno could gather, the capita per annual consumption of salt by different nations is:

about	50	catties	United Kingdom.
,,	37	,,	Germany.
,,	37	,,	France.
,,	27	,,	Austria.
,,	24	,,	Corea.
,,	21	,,	Russia.
,,	20	,,	Japan.
,,	18	,,	Hungary.
,,	14	,,	Formosa.
,,	13	,,	Spain.
,,	11	,,	Italy.

When it is considered that 90% of the Formosan population (except aborigines) are of Chinese origin, and that they still adhere to their old modes of life, and in fact are more conservative than most of the citizens of the new Republic, then Mr. Hsiung's "13 catties per capita" may be accepted as justifiable.

Under the present circumstances there seems no necessity to reduce the current rate of taxes and other impositions. Mr. Hsiung proposes to continue to tax two taels five mace per picul of salt. This was based apparently on General Teh Liang's Memorial to the Throne, made eight years ago. It is true that the Kiangning Salt Gabelle Office is imposing Tls. 2.50 per picul all told, but at some other places less than Tls. 2.50 is imposed on a picul.

It is, therefore, safe to say that Tls. 2.25 per picul can be borne by the people without any difficulty.

That will mean a gross income of about Tls. 73,000,000 on the reorganized Salt Gabelle, i.e., more then twenty-five million taels over the gross revenue in the budget for 1912.

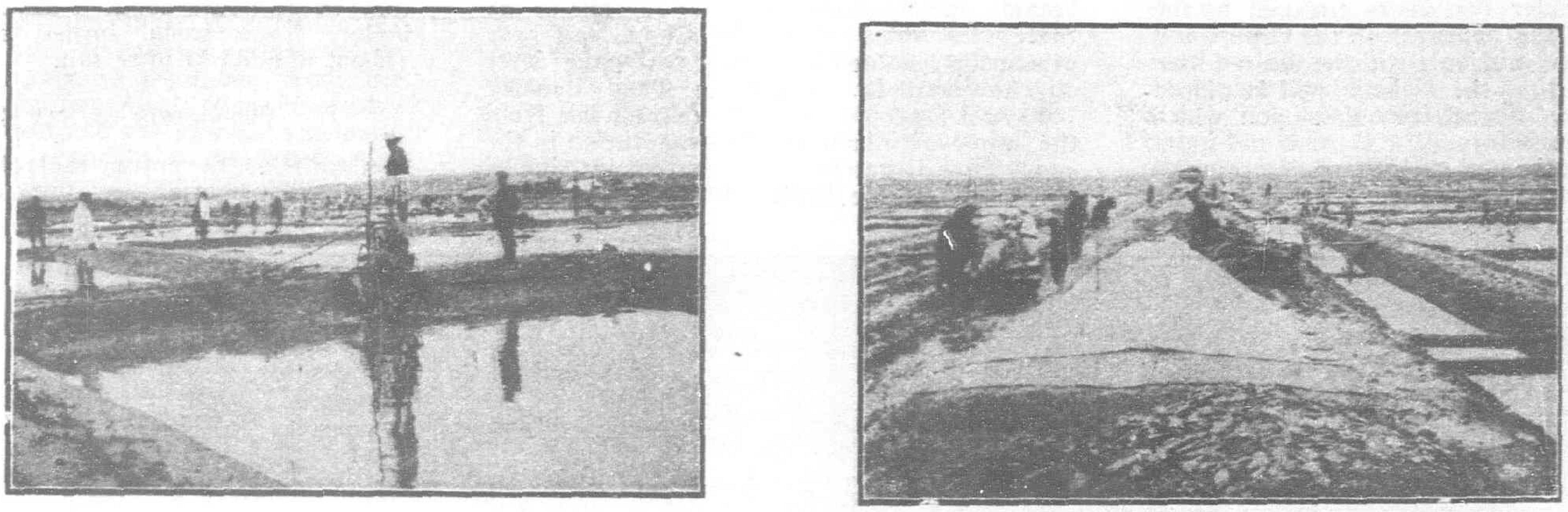
What the increase of revenue would be, if Mr. Hsiung's plan of reorganization were to be carried out, or if the proposed reorganization under foreign administration were adopted, Messrs. Odagiri and Midzano are not prepared to venture to forcast.

INCOME AND EXPENDITURE.

How much the provinces contribute towards the Salt Gabelle can be seen from the following table of the Budget for 1912 prepared by the Department of Finanee:—

Province Revenue	in Kuping Taels
Fengtien	1,655,694
Kirin	1,865,766
Heilungkiang	1,013,735
Chihli	5,236,818
Kiang-ning (Nanking)	3,968,269
Kiangsu (Soochow)	16,439
Anhui	....
Kiangpeh	29,982
Shantung	1,725,662
Shansi	1,346,162
Honan	296,322
Shensi	441,322

Province Revenue	in Kuping Taels
Kansu	167,518
New Dominion	19,618
Fukien	1,088,213
Chekiang	2,406,329
Kiangsi	72,120
Hupeh	1,768,584
Hunan	251,925
Szechuan	6,721,993
Kwangtung	5,486,962
Kwangsi	567,528
Yunnan	1,337,500
Kweichow	13,640
Jehol	63,335
Chahar	8,050
Szechuan Yunnan Boundaries	6,000
Ili	....
Total	47,575,486

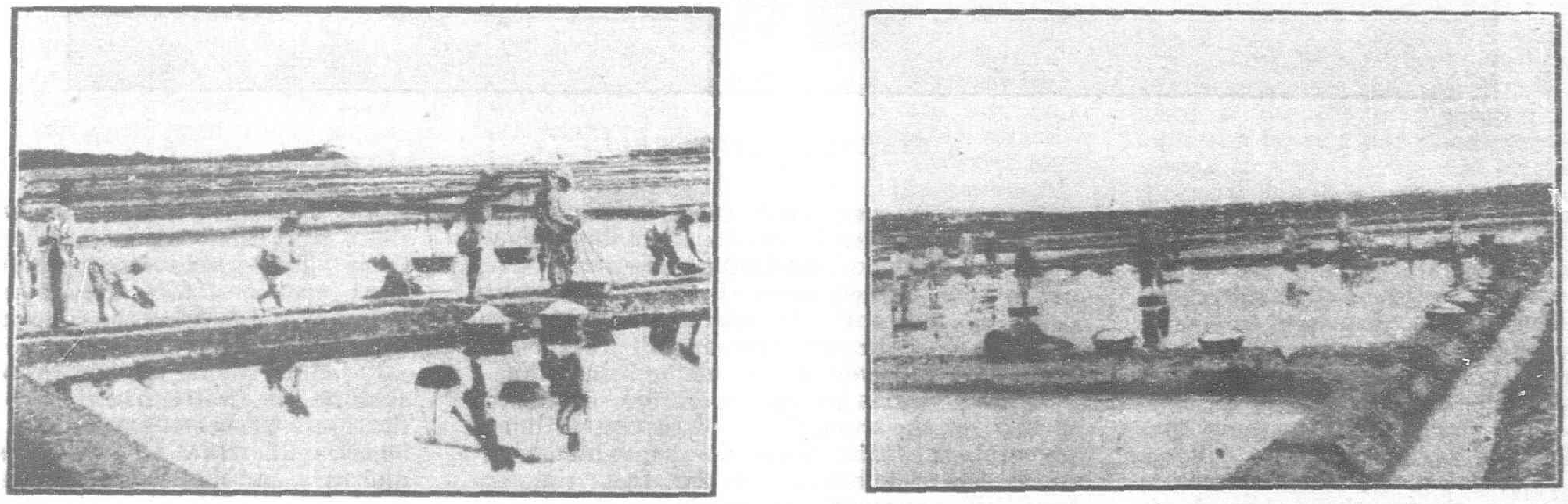


A TYPICAL CHINESE COASTAL SALT MARSH AND EVAPORATING BED

The following list which appears in the Budget for 1912 prepared by the Department of Finance shows the items of the present Salt Gabelle revenue and expenditure:—

Revenue

Ordinary Revenue	in Kuping Taels
Salt Land Tax and Oven Tax	262,056
Regular Tax	7,699,526
Likins	9,019,352
Surtax	17,317,578
Miscellaneous contributions, etc.	2,239,245
Gross profits of Government Transportation Service	5,462,278
License for free manufacture and sale of salt, etc.	2,440,104
Miscellaneous items	3,070,796
Total	47,519,935
Extraordinary Revenue	
Tax and Likins	21,527
Miscellaneous contributions	240
Gross profits of Government Transportation Service	31,734
Miscellaneous items	2,050
Total	55,551
Grand Total	45,575,486



COLLECTING SALT FROM THE BEDS

In addition to the above the Budget has an item of Salt Contribution amounting to	8,607

Expenditure

Ordinary	
Central Salt Gabelle Office	179,274
Provincial Salt Gabelle Yamens and detached offices	3,897,741
Provincial Salt Transportation Service	3,283,026
Extraordinary Expenditure	
Provincial Salt Yamens and detached offices	133,654
Provincial Salt Transportation Service	7,202
Total	140,856
Grand Total	7,500,807

Salt Gabelle and Foreign Loans

The revenue of the Salt Gabelle mortgaged for foreign loans is as follows:

Year	*Loan Secured.*	*Salt Revenue Mortgaged*
1898	Anglo-German Loan of £16,000,000 (besides Custom revenue)	Tls. 1,800,000
1901	Boxer Indemnity (for convenience sake take 1912 figure £3,000,000)	20,000,000
1908	Anglo-French Peking-Hankow Railway Loan of £5,000,000 (besides other securities)	2,350,000
1911	Hukuang Railway Loan of £6,000,000 (besides other securities)	950,000
1911	Liang Kiang Silver Loan of Tls. 3,000,000	40,000
1911	Hupeh Silver Loan of Tls. 2,000,000 Ichang Salt Likin	1,000,000
	Total Tls.	26,840,000

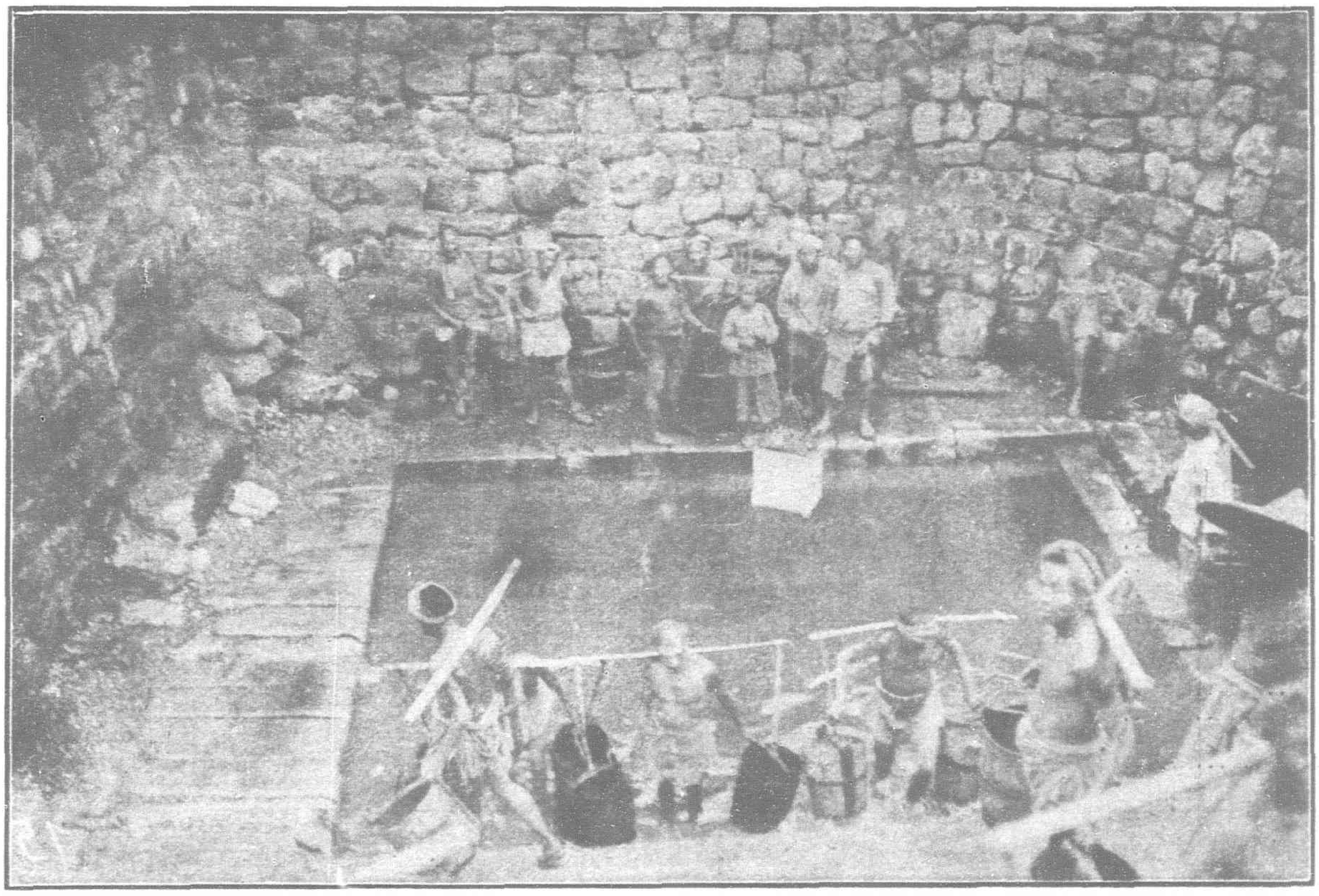
It is understood that Tls. 500,000 of the Salt Revenue is secured for a Chihli bond and Tls. 100,000 for a Hupeh bond. There are doubtless, a few more small provincial loans for which the Salt Gabelle is mortgaged, However, the total amount of revenue mortgaged for these bonds and loans will not be very large, say, not more than one million taels. This much added to the aforesaid total, the grand total of the Salt Gabelle Revenue already mortgaged for China's indebtedness will be Tls. 27,840,070.

Since the above was compiled by Messrs. Odagiri and Midzuno the Crisp Loan of 1912 for £10,000,000 was secured upon the revenues of the Gabelle. There are also the Six Group advances of 1912 of £12,660,000 and the Currency Loan of 1911 of £10,000,000.

Proposed Reform of the Gabelle

The prolonged discussion that has centered round the Salt Gabelle was evoked by the proposal that the Gabelle should be reformed under foreign supervision and be pledged as the security for the large reorganisation loan which China desired to obtain from the Six Power Banking Group. The Group deemed it expedient and necessary to supervise the expenditure of any further large loan, owing to the unsettled state of the country and the chaotic condition of the finances, and although no definite programme of reform of the Salt Gabelle had ever been laid before the Chinese Government by the Group it was stated in general terms that control something on the lines of the Maritime Customs was desired in the interests of bondholders. The Maritime Customs revenues are so controlled that they remained intact despite the Revolution and the desperate straits in which the finances of the Revolutionists and Manchus were placed. Both sides were ready to make any sacrifice for money to carry on their respective campaigns, but the revenues collected from their own country's trade were fortunately preserved and withheld from their reach. Thus, and thus only, was China's credit upheld during the recent 'Revolution. It is certain that had the Customs revenues been available to the respective sides during the revolution the country would have been bankrupt to-day. The Group, in considering the advancement of further large amounts to China, felt that it would be disastrous to make loans without some tangible security that could be made assignable in the event of default on the part of the Government, or could be maintained under foreign control in the event of another crisis like the recent revolution. On the plea that China's sovereign rights were being infringed even by the suggestion to have the Salt Gabelle supervised by Europeans, the people and the Government—or rather a section of both—stoutly opposed the proposal, and thus the loan deadlock has been prolonged until this writing, though a compromise is now thought possible. The Group is said to have agreed to the Chinese themselves reforming the Gabelle under foreigners engaged by the Chinese, with the approval of the Group, and it is likely that not only will the desired loan be made but that the Gabelle will be placed upon a footing different from that upon which it has ever been before.

The Chinese themselves have made proposals for reform, the Government's scheme being that the Government will buy all salt produced from the holders of leases of salt-lands and re-sell it to merchants after adding the tax of $2 per picul, thereby facilitating the collection of the tax and preventing dishonest collusion between the producer and the merchant. A year or two hence the Government will resume possession of the salt-lands of the interior and establish up-to-date factories throughout the coastal provinces, at which salt-bricks will be manufactured according to the Dutch system.



A SZECHUAN SALT WELL

Mr. Chang Chien, who has devoted much of his time to the study of the Salt Gabelle also compiled a book on the necessary reform of the salt affairs of the whole country, but the Union of the Salt merchants thought that most of the contents of the book were impracticable, and submitted to the President a petition containing 55 articles suggesting the inadvisability of carrying them into effect. After perusal, the petition together with the book was forwarded to the Ministry of Finance for consideration.

In all probability the Government will seriously investigate the condition of salt control and revenue collection, and with the aid of foreigners will not only augment the returns to the state but will at the same time lighten the burdens now being borne by the people.

THE MANUFACTURE OF SALT IN CHINA.

From time immemorial the production of salt has formed a subject of especial care to the Chinese Government, and here it is necessary to remark that in the remotest periods the salt trade was in China as highly esteemed as agriculture. Annually, at the opening of the salt-works, princes were present in person, and took an active interest in the first salt boilings; it cannot, therefore, be surprising that with such attention and encouragement on the part of princes, the salt trade rapidly assumed large proportions and became an important source of revenue to the State. In olden times in China salt was principally obtained by boiling sea-water; later on, however. i.e. under the Tang dynasty (620 A.D.), people began to extract salt from the water of inland seas by evaporation in the sun. The operation was extremely simple. The earth on the banks of the lake was dug out, reservoirs were made there for water and the water was conducted to them by ditches made on purpose, and leading from the lake or, in some places, from the sea. The water dried up, and the salt remained behind as a deposit. But the majority of salt-workers in those days followed the old method of boiling.

As the success of the operation depended mainly on the condition and correctly timed preparation of the brine, the superintendents of the salt trade began to evolve from time to time different means of producing it. From A.D. 1132 the following method was introduced for preparing brine. The whole of the sea-shore in the neighbourhood of the salt-works was measured out and divided into a number of small, regular squares; the surface layer of earth in each was dug out; the ground was then strewn with straw, and the earth that had been dug out thrown back upon it. The name given to it in those days was *lu*, an oven. The largest *lu*, were not more than 2 ft. high and a fathom in circumference; but at the sides of the *lu* little ditches were made for the brine to run off. After the ovens had been thus arranged, the next step was to soak them with sea-water, and as this was an easy task, it was entrusted to women and children. After a short time the brine in the interior of the ovens gradually formed and ran off into basins. In order to test its degree of strength, small stones of a certain kind were thrown in; if they remained on the surface, the brine was considered good; if they sank under, it was called sweet, and in that case the ovens were abandoned for some other spots in which the earth was more suitable. The brine when fit for boiling was immediately poured into buckets and carried to the ovens. In these were set large evaporating basins, and 3-5 of them were always attached to each brine-oven. The boiling took place at once and was continued without interruption; when ready the salt was immediately shovelled out of the basins, and fresh brine poured in, so that in 24 hours about 5 basins of salt were boiled. Each basin turned out 3-5 piculs (about 18 pud) of pure salt.

PRODUCTION OF SEA SALT.

After the 15th century the following method of procuring brine was pursued in all salt-works on the sea-shore: Pits were dug on the shore and bamboos were laid crosswise over them. The whole was covered with double mats, and sand was strewn on the top. Every morning and evening the covering of sand was soaked with sea-water by the tide, and the salt liquor found its way into the pits. As soon as the water had retired from the shore the salt-workers came out with flaming bundles of straw to test the saltness of the moisture, and they were not convinced of their work being good unless the salt vapour, which rose from the pits, extinguished the fire. The brine thus produced was drawn off and carried to the salt-works, and salt was obtained from it uncommonly quickly. Somewhere about the same date, at the salt-works in the north, the most convenient plan was found to be to obtain the salt by exposure to the air and sun.

At the present moment in China salt is produced under three forms: sea-salt, lake-salt, and well-salt. Sea-salt is either boiled or obtained by exposure, and is found in all the maritime provinces, viz., in Chihli, Shantung, on the banks of the River Huai, and in Chekiang, Fukien and Kuangtung. Lake-salt is obtained in Shansi, Kansu, and Shensi, and to a certain extent is imported from the country outside the frontier, i.e., from the pasture-grounds of Chahar, from Ordos and Kokonor. Well-salt is obtained in Kansu, Szechuan and Yunnan. Sea-salt is obtained in the most important quantities, for which reason a quantity of descriptions are found, in Chinese writings, of the manner in which it is produced. We borrow from them some details.

The salt-works are dispersed over the whole extent of the line of coast, and are considered better, or worse, in accordance with the quality of their salt. In all of them the manufacture of salt takes place at a fixed season, consecrated by time and custom. According to Chinese notions, the 3rd, 4th, and 6th months (April-July) are the most favorable for manufacturing salt; and they maintain that at this time, when vapours are rising from the ground, the exudation of salt comes into play with them. In autumn the vapours gradually cool, for which reason the exudation also diminishes by degrees; but in winter, on account of the frost, the vapours disappear altogether, and with them the exudation disappears as well. On this account the manufacture takes place only during the hot weather and hardly any occurs in the winter. To obtain sea-salt the Chinese employ two methods: they either boil the brine, or else they leave the sediment of salt in the sun to evaporate.

The period of boiling is divided into three stages, the technical names of which are (1) *Shai-hui* (sunning ashes), *Lin-lu* (filtering brine) and (3) *Fu-huo* (boiling). The preparatory manipulation called *Shai-hui* consists in the following: on the very first day of opening operations in the salt-works the seashore is cleared of weeds, and a beginning is made by digging out the upper layer of earth and breaking it up; this earth when broken up is turned over and over with bamboo poles until it is fine and smooth. Then sea-water is brought from ingenious receptacles, which are filled with water at high-tide, and the earth is moistened with it, as with light rain, equally and thoroughly. Towards evening the earth is shovelled to one side, and a long line of mounds is formed of it, in order to protect it from rain during the night. On the following day the procedure is the same as on the previous day, except that the earth is carried to some particular spot for safety. In fine weather it is taken out again from time to time, and dried on the salt-grounds.

As soon as the earth has been thoroughly prepared, i.e., is completely impregnated with salt particles, the workers take it to the ovens. These ovens, which are shaped like chests, 9ft. long, 2 ft. broad, and 3 ft. deep, are called Lu; near each a well 8 ft. deep is dug. The floor of the oven is strewn with rotten wood; above this are fine bamboos; on them is a layer of brushwood, and above all is a layer of ashes of plants. The prepared earth is shot upon this, beaten hard and covered over with rice straw. On this is poured sea-water, which finds its way through all the inner layers, and flows into the well as brine. Each oven in 24 hours gives more than 20 *tan* (60 pud) of pure brine, which is drawn out of the well and taken to the boiling oven to be boiled. The salt boiling continues without interruption throughout the whole time of the operations. In each oven are several pans of different sizes, part of which are to hold the cold brine, part to boil it. Each boiling begins at 11 p.m. and continues until 10 o'clock on the following morning, and during this period salt is taken six times. As soon as the salt begins to harden, pods of the *tsao-chio* tree (*Gleditschia chinensis*) are thrown into the pans, in order that the particles of salt may combine more quickly, and when the salt is ready the party of men who are watching inform the others of it, in order that it may be cleared out at once and the pans may be filled with fresh brine. On an average 600 catties of the best brine turn out 140 catties of pure salt, called by the Chinese "fire salt" (*huo yen*). It appears in three qualities and colours: white, dark and yellow: the white is the best, the dark not so good, and the yellow much inferior and of a bitter taste.

The second method (exposure to the air and evaporation in the sun of saline sediments) is distinct from the first, in that the brine is not boiled, but poured into peculiar paved tanks, and left there to the sun and wind. For complete evaporation two days in summer and 3-4 at other times are sufficient, and indeed the N.W. wind is quite as favorable to this operation as are the sun's rays; on the other hand, with unfavorable winds, and in rainy weather, no salt is taken.

Almost the whole of the available flats on the coast line along Shantung, Chihli Province, and Fengtien are devoted to salt production, and particularly so the flats about Taku, on the Gulf of Pe-chihli, and Fengtien. Every visitor to Tientsin who proceeds along the Pei-ho River or along the railway must have been struck by the immense mounds of salt either on the flats or at the storage grounds near Tientsin. Also interest could not fail to have been evoked by the curious wind-mills which raise the salt water from the canal connecting the sea near Tongku for distribution to the various beds. These mills are driven by the wind acting upon sails of the pattern usually seen on sampans, and the country is dotted with them for a considerable area. In this issue we give photos of them in operation. The flat which extends to the south of Yingkow for nearly twenty miles is one continuous field of salt-pans, and the same may be said of the flats about Tongku. In Shantung, too, similar conditions obtain at various places. In fact there are ten salt-manufacturing centres in this province belonging to the Government, the total annual production being about 7,490 piculs. In other coastal provinces salt beds are frequent, and in fact extend right down the Tongking coast to Annam and Cochin-China.

The Salt Wells of Szechuan.

The great brine deposits of Szechuan are contained in the south-central part of the province, between the T'o and Min Rivers, which enter the Yangtsze at Lu Chou and Hsu-chou Fu respectively. Near the Min, at the Wu-tung Ch'iao Wells, the brine is found at a depth of about 500 feet, while near the T'o, at Tzu-liu-ching, where the most numerous and most productive wells are worked, the depth runs from 1,000 to 3,000 feet. These two great salt areas lie near the centre of the Red Basin, and the brine is found underlying the sandstone crust which covers it; but brine is found and worked at lesser depths throughout the east of the province, and, even to the east of the Red Basin, such as at the eastern end of the city of Kueichou Fu, where, during low water seasons, pits are dug on both banks of the Yangtsze, brine is struck at a depth of about 30 feet and evaporated on the spot. In the south-west of the province, in the Chien-chang Valley brine is found and worked at Pai-yen-ching—"White Salt Wells" —within the district of Yen-yuan Hsien, where it lies at a depth of about 50 feet. To give an idea of the process of salt manufacture in Szechuan, Sir Alexander Hosie quotes from notes made in his diary when visiting the Kueichou Fu, Tzu-liu-ching, and Pai-yen-ching salt works.

"In the middle of an evidently temporary village at Kueichou Fu I found a wide pit, about 30 feet deep, at the bottom of which brine was bubbling up at two places a yard or two apart and men busy as ants dipping their buckets in the brine, carrying them up the sides of the pit, and emptying their contents into wooden tubs, whence the brine was led by outlets, covered with bamboo sieves, into shallow wooden troughs connecting with cement-lined storage tanks of no great size or capacity. From the tanks the brine was baled into smaller wooden tubs, also provided with sieves and lengths of bamboo, leading to large iron circular evaporating pans, about a yard in diameter and a foot in depth. These pans fitted loosely into circular holes in the ground, beneath which were large open furnaces visible from small openings through which they were supplied with coal. Under each furnace was a tunnel, about 4 feet high and 3 feet wide which acted as a draught chamber, and carried the smoke through cinders banked on the opposite side of the evaporating pan. The brine in the pans was boiling and in process of crystallization, and I was informed by the workman that one or two days were required to complete the evaporation, the furnace being kept burning night and day. Pan and granular salt were both being evaporated. The furnaces which are built of mud and cinders, have to be rebuilt every ten or twenty days, and the fact that evaporation can be carried on for only four to five months out of the twelve accounts for the temporary character of the works. During the rest of the year the shingle bank is covered by the rise in the river, when work is, of course, impossible, and the same conditions apply to the works on the south bank. The salt on production costs 20 cash a catty; but there is a likin station at the works through which all the salt has to pass, and which, after duly weighing each load, exacts 12 cash a catty, bringing the price up to 32 cash. When the tax has been paid the load is lightly sprinkled with a red powdered substance, which takes the place of a seal.

I gathered that the total number of furnaces at work amounted to some 110 on both banks of the river, and I think that the output of both pan and granular salt for the five months cannot exceed 30,000 piculs, or about 2,000 tons.

It is necessary to explain here what is meant by pan and granular salt. Pan salt is the salt that crystallizes and cakes on the side of the iron pan during the boiling and evaporation of the brine. This is caused by keeping the furnace well supplied with fuel and developing great heat. In the case of granular salt less heat is applied, and the crystals form and remain separate without caking. At Kueichou Fu the brine is as clear as the water of the Yangtsze itself, and no purifying of the granular salt, such as is practised at Tzu-liu-ching, is required. Pan salt may be of any thickness from 2 to 6 inches, and being shaped like the pan, and therefore inconvenient for transport purposes, it is broken up usually into four pieces."

The Tzu-Liu-Ching Wells

The following may be taken as an accurate description of the brine wells of Tzu-liu-ching:

"I found myself seated—a settle had been procured for me—beside a square stone embedded in the ground, with a central hole a few inches in diameter. From the hole there was issuing a hempen rope about an inch thick, which ascending, passed over a movable wheel fixed at the top of a staging some 60 feet high, and bearing a striking resemblance to the shears at a dockyard. On leaving the shears the rope descended and passed under another wheel fixed a few feet above ground, whence for the moment it escaped from our range of vision. After the lapse of a quarter of an hour the top of a tube, from 9 to 10 inches in circumference, attached to the rope, made its appearance, and was drawn up to within a foot of the wheel. Meantime a workman stationed at the mouth of the well had thrown a rope round the tube, which was composed of the stems of a number of bamboos fixed together, and immediately the lower end appearing he drew it to one side and over a wooden reservoir built into the ground. Embracing the tube with his left arm, he plunged an iron rod which he held in his right hand into the bottom, and, raising a leather valve which was there adjusted, allowed the contents, consisting of black, dirty-looking water, to escape into the reservoir. This was the brine. The tube was again placed over the well, and descended with great rapidity. Whence the motive-power that raised the brine? Following the rope after it left the second wheel I found that it entered a large shed, the floor of which was several feet underground. In the centre of the building was an enormous bamboo wheel or drum, 12 feet in height and 60 feet in circumference, placed on a vertical axis to which the rope was attached 6 feet from the ground. As I entered four huge water-buffaloes were being harnessed at equal distances to the circumference of the drum; each buffalo had a driver, whose duty it seemed to be to belabour the animal with a short, stout hempen rope to induce it to break into a trot. As the drum revolved the rope coiled round it at a sufficient height not to impede the buffaloes. For a quarter of an hour—this is, until the tube had been raised—this unmerciful beating went on, when the poor beasts, exhausted, white with froth, were unharnessed and led back to their stable, whence a fresh relay was brought. When the animals were unharnessed and the signal given the drum reversed with great velocity, creating a violent wind all round. Forty animals were employed at this well, and each relay raised the brine about ten times every twenty-four hours. They are specially selected for the work, and cost from Tls. 40 to Tls. 50 apiece. The specimens I saw were fat and in excellent condition, but although they are carefully fed and attended to, each costing 300 cash a day, their staying power does not exceed five years. Many even fall within the first year; nor is this to be wondered at, for the make of the animal fits it for a slow plodding life only.

Natural Gas

"Retracing my steps to the large reservoir by the well, I found that the brine was being carried off in bamboo pipes laid down between it and smaller wooden reservoirs in the evaporating sheds, which I next visited. On the floors of the latter rows of brick furnaces, with round openings at the tops, were built. On each furnace rested a round, shallow iron pan, about 4 feet in diameter, filled with brine conducted in open bamboo pipes from the reservoirs, which occupy one side of the shed. Where was the fuel? Under each pan was a flame blazing from a bamboo tube coated with lime and fitted with an iron burner, while all round flames burst from smaller upright tubes and lighted the sheds, for there was no cessation, night or day, in the work of evaporation. I was next conducted to the 'fire well,' whence the fuel is procured. It was quite close to the brine well, and was carefully built over bamboo tubes covered with lime—to prevent escape—ramifying from the cap covering the mouth to the evaporating sheds. There can be little doubt that the 'fire wells'—which are nearly all situated within the town—contain petroleum, from which the vapour or gas arising supplies the natural fuel. They have, however, never been worked for the oil. The stench which permeates the whole town reminds one forcibly of a gasworks, but the gas has not, as in some parts of Ohio, been utilized to light the streets. All the wells, which are worked by private companies, are now under Government control, and there is an office established at Tzu-liu-ching through which all salt transactions are carried on. The actual cost price of the salt is 13 or 14 cash a catty, but the Government manages to extract from buyers 22 to 23 cash.

"The salt is of two kinds—pan, or lump and granular salt. The former is from 2 to 3 inches in thickness, and is of the same shape and size as the evaporating pans. In preparing the latter, bean flour is used to give it a whiter appearance. The work of evaporation occupies from two to five days according to the strength of the gas flames. As the salt wells number over a thousand, and the 'fire-wells' only about a score, much of the brine is carried into the town for evaporation. Pans are leased by the year, the privileges costing about Tls. 40 each. A contractor supplies the pans, which weigh 1,600 lbs. apiece, for from Tls. 30 to Tls. 40 a year each, the old pans, which are changed about once a fortnight, being the property of the contractor. Brine is found at depths varying from 700 to over 2,000 feet, and from a dirty yellow in the shallower, becomes a deep black in the deepest wells. Twice as much salt is evaporated from the black as from the yellow brine—the deeper the well the stronger the solution. As the region in which the wells are situated is of sandstone formation, the difficulties of boring to these great depths, even with primitive machinery, are not very great. A bamboo lever is erected over the spot where the operations are to be carried on; an iron jumper, over 100 lbs. in weight is attached by a bamboo rope to the thin end of the lever; on both sides of the thicker end scaffoldings with plankways are built; several men jump simultaneously from the planking on one side to the planking on the other, using the lever as a stepping-stone; and the jumper is raised, released, and falls, crushing the stone, a rotary motion being imparted to the weight by a man who stands by the mouth of the well, and twists the bamboo rope as the lever is about to drop. The rope is lengthened as required by adding strips of split bamboo. I have heard doubts expressed as to the depths of these wells, but the figures given are unimpeachable. The well which I visited was over 2,000 feet in depth, and I arrived at this result by a very simple calculation. The drum was 60 feet in circumference, and thirty-four coils of rope were wound up before the tube reached the mouth of the well. In boring in the vicinity of the town, at least, it is impossible to predict whether petroleum or brine will be struck, but as both are valuable, the result is always satisfactory."

The diameter of the mouth of the well is usually from 9 to 10 inches, and the diameter of the bamboo tube-bucket 4 inches. The length of the latter depends on the height of the triped shears, and may run to 80 odd feet. The wells are lined for the first 200 or 300 feet with cypress wood in lengths of about 6 feet. These are first cut in two lengthways and then hollowed out. A bamboo tube-bucket costs about Taels 20, and the hemp rope costs another Taels 20. Mules, oxen and water-buffaloes are all used for turning the whim, or drum, which winds up the bucket. The cost of raising the brine runs from 12 to 14 cash a catty, and of evaporation 2 to 4 cash; but the latter is regulated by the price of coal, which is brought into use only when the gas is being employed to its utmost capacity. These prices refer to a brine well in juxtaposition to a hydrogen well; but, as much of the brine has to be carried to the gas evaporating sheds, the cost of carriage has to be added, and it may be taken for granted that 20 cash represent the fair average value of a catty of salt before taxation. The amount of salt evaporated from the brine rises from 7 per cent., in the case of the yellow liquid from the shallower wells to 13 per cent. for the black drawn from the deep wells. In manufacturing granular salt from black brine the following purifying process is adopted:—

Yellow soja beans are ground up with cold water in a stone mill. The liquid with the ground beans is collected, poured into a pan and warmed. It is then filtered through a strainer on the top of the boiling brine, causing precipitation of the impurities in the latter. The floating impurities are skimmed off, and the salt crystals baled into a bamboo basket, which retains the solid matter. The salt crystals are now fairly white, but if still further purification is desired, the water in the pan is poured over them and drains away any remaining impurities. The liquid so drained, called "*Tan Pa,*" is used to cause coagulation of the legumine in manufacture of beancurd, and, for convenience of transport it is evaporated, resulting in a substance as hard as stone.

The Pai-yen-ching Wells

"The brine wells of Pai-yen-ching, in the south-west of the province, are two in number—one is off a dirty street, the other behind the town. They are both about 50 feet deep. The mouth of the former is some 8 feet long and 2½ feet broad, and the brine is raised in narrow wooden buckets, to the sides of which bamboos tied together are fixed, and serve as raising handles; the latter has four round mouths lined with wood, and the brine is raised in round wooden tubs with similar bamboo handles. The evaporation pans, which are manufactured from iron obtained in neighbourhood, are cone-shaped—the apex of the cone forming the bottom—and vary in height from about 1 foot to 2½ feet. They are serviceable from 10 to 20 days. The furnaces are built of mud with holes for the pans; and coal (lignite) is the fuel used. The process of evaporation is as follows: a litttle brine, which is light in colour compared with that at Tsz-liu-ching, is poured into the heated pan; the brine bubbles up to the top of the pan, and deposits a thin layer of salt on the inside; a little more brine and another layer is the result, and so on until the salt is some 3 or 4 inches thick. Care must be taken to keep the pans supplied with brine, otherwise the salt cones would crack and break up. (They are transported whole on the backs of pack-animals). Two days and nights are required to evaporate the necessary size. This salt, which is very much inferior to the salt produced at Tzu-liu-ching, supplies the south-west of Szechuan, finding its way even north of Ningyuan Fu. There are seventy-two evaporation houses, the number of pans in each varying from twenty to thirty. The total production is over 2,000 catties a day. The pans vary in price according to size, the larger costing 1,800 cash each. The coal (lignite), which is found west of Pai-yen-ching, is exceedingly cheap, about a cash a catty. It is found just under the surface of the ground, and little labour is expended in mining it. About 3,000 catties are daily consumed by a house boiling ten large and ten small pans. The price of salt when it leaves the evaporator's hands is a little over 30 cash a catty; but there is a local Government tax of 12 cash a catty, so that the actual cost to the consumer (on the spot) is over 40 cash.

"The above is a description of the work of salt evaporation in the east, centre, and west of Szechuan; but, the greatest centres of the salt industry lie in the centre of the province at Tzu-liu-ching, where alone natural gas is utilized, and Wu-tung-ch'iao, near the banks of the T'o and Min Rivers respectively. At the latter place, which ranks second to Tzu-liu-ching in output, only pan (or lump) salt is manufactured. It is of a decidedly black colour, and is exported in large quantities to Kweichou and Yunnan. Coal from the hills lying behind the right bank of the Min, and opposite the salt-yielding area is the fuel used on the evaporation. There are altogether forty districts of Szechuan which produce salt, and withered grass, lignite, wood, coal, and gas are all taken advantage of, each as the others are unavailable, for fuel.

"Various and very varied estimates have been made of the annual production of salt in Szechuan. I have made inquiries from time to time in China regarding the consumption of salt in family life, and I have found that the amount differs according to the supply of salted fish, vegetables, and food generally procurable in the market. If they are abundant the family consumption is less, and vice versa. In Szechuan there is practically no salted fish, but vegetables are salted and exported from the province, and the result of my inquiries it has led me to consider that 10 Chinese ounces per month, or about 8 catties a year, may be taken as a fair estimate of individual consumption. In this estimate, I am allowing for a reduced consumption by children. If, then, the population of Szechuan be taken as 45,000,000 the annual consumption of salt would be 360,000,000 catties, but the province supplies Eastern Hupeh, nearly the whole of Kweichou, and north-eastern Yunnan. It has been ascertained that the Salt Office at Ichang annually levies on Szechuan salt entering Hupeh a sum approaching Tls. 2,000,000 and that the tax amounts to 28 cash a catty. Taking the value of the total to be 1,200 cash, the tax would annually account for an import into Hupeh through Ichang of 86,000,000 catties. I propose to take 80,000,000 catties as the minimum of Szechuan salt passing through Ichang and add 4,000,000 catties for salt carried overland into Hupeh as well as for consumption in that province to the west of Ichang. Kweichou and Yunnan remain, and it may be fairly assumed that the population of these two provinces drawing salt from Szechuan does not exceed 5,000,000. At the annual allowance of 8 catties per head Kweichou and Yunnan would require 40,000,000 catties. On this basis I am forced to the conclusion that the annual production of salt in Szechuan amounts to not less than 484,000,000 catties. This, however, does not include what is used in pickling, salting, and other industries, and I am inclined to put the total output at about 500,000,000 catties, equivalent to some 300,000 tons. It may be asked, how does this compare with other estimates? I take two writers on this subject. One gives 206,181,600 catties as the total production, which would place each individual in this province alone on the altogether inadequate allowance of about 6 Chinese ounces per month, or 4½ catties a year; the other states that he considers the production of the districts for which the T'o River is the outlet to be 600,000 tons, i.e. 1,008,000,000 catties, which would give each inhabitant of Szechuan over 22 catties a year, a manifest superabundance derived from only one, but indoubtedly the richest, salt area in the province.

"The Salt Commissioner's figures fall slightly short of my estimate, but they do not cover illicit salt, which is produced in considerable quantities, and eludes official cognizance. Of this illicit salt it is impossible to form any trustworthy estimate. Some would have me believe it amounts to 50 per cent. of what is controlled by Government, but if even 10 per cent. be added to the Commissioner's figures the result exceeds 500,000,000 catties or about 300,000 tons. If, then, 20 cash be taken as the cost price of production of this amount, the total value at the wells is Tls, 8,607,265.

"At the centres of production salt, after payment of the Government tax, is retailed for consumption within limited areas; but salt intended for consumption throughout Szechuan generally is transported under Government certificate, and at destination retailed under licence. The retail price is also fixed by Government, and varies from time to time. The present price at Chengtu is 51 cash, or less than 1d. a lb."

[It must be understood that no claim is made to originality in this article. Various authors who have made personal studies with regard to this subject have been freely consulted, in order that a compilation might be made giving a fairly accurate idea of the past and present method of controlling and manufacturing the product. Special acknowledgment has to be made to the following: F. Hirth, "Notes on the Early History of the Salt Monopoly in China," ("Journal of the China Branch of the Royal Asiatic Society"); Arthur von Rosthorn, "The Salt Administration of Szechuan" ("Journal of the China Branch of the Royal Asiatic Society"); E. H. Parker, "The Salt Revenue of China" ("Journal of the China Branch of the Royal Asiatic Society"); P. Zwehtkoff, "Remarks on the Production of Salt in China" ("Journal of the China Branch of the Royal Asiatic Society"); Dr. J. Edkins, "Banking and Prices in China,"; H. B. Morse, "Trade and Administration of the Chinese Empire" E. S. Williams, "Taxation in China" ("Quarterly Journal of Economics"); Masnoske Odagiri and Kokichi Midzuno, "Salt Gabelle Revenue of China;" "Report by Consul-General Hosie on the Province of Szechuan;" and Maritime Customs' Reports.]

TOKYO INDUSTRIAL EXHIBITION

The estimated expenditure, of 950,000 *yen*, for the Industrial Exhibition to be held in Tokyo in the same year in which the coronation of H.M. the Emperor will take place, has been submitted to the Municipal Council. The amount is thus allotted:—176,000 *yen* for 1913-1914; 724,000 *yen* for 1914-1915; and 50,000 *yen* for 1915-1916. A building covering 2,800 *tsubo* will be completed within next year and in 1914 the main building, covering over 10,000 *tsubo* will be erectedf or use from August to December. No opposition is offered to the scheme from any quarter whatever, but in view of the impoverished condition of all available sources of revenue, how to meet the required expenditure will prove a tough question to solve, says the *Jiji*.

INDIAN RAILWAY EARNINGS

The statement of the approximate gross earnings of the Indian Railways shows that for the period, April 1st to Octr. 26th, 1912, the total earnings of State and Guaranteed Railways have risen to Rs. 3,066¼ lakhs, which is no less than Rs. 363 lakhs better than for the same period last year. The principal contributors to this increase are the Bengal-Nagpur with Rs. 59½ lakhs; East Indian with Rs. 73¾ lakhs; Great Indian Peninsula with Rs. 50½ lakhs; Madras and Southern Maharata with Rs. 10½ lakhs; North Western with Rs. 95½ lakhs; Oudh and Rohilkhand with Rs. 26¾, lakhs; and Rajputana Malwa with Rs. 24⅓ lakhs.

DEVELOPING THE PHILIPPINES

AMERICA-PHILIPPINE COMPANY

Another splendid development investment in the Philippines is promised in the recently organized and incorporated America Philippine company, reports the *Manila* Times of December 4, and continues:—Composed of a group of well known business men and bankers of New York, Chicago, St. Louis, Kansas City, Detroit, Cincinnati, Indianapolis, Minneapolis and other cities it proposes to interest itself in the development of the products of the Philippines. It has a capital stock of P. 10,000,000, fully subscribed and its members are capable of furnishing any further capital that may be needed.

Full details of the plans of the company have not been received here but it is known that one of the plans of the new company is to interest Filipinos in the several local enterprises that will be undertaken and to induce them to share in them, to introduce a system of profit sharing in which all employes will have participation and at the inception of any business or enterprise to inaugurate a system of pensions for employes to be paid when old age prevents full service.

A party representing the company will leave New York about the middle of December and will arrive here about the middle of January. They are coming for a general survey of the islands and a study of resources, needs and business opportunities. They will be accompanied by experts in fibers, sugar, tobacco, hardwood and power and will be in a position to expert any proposition that is presented to them.

Speaking of the plan of the company a man who has some knowledge of the circumstances under which it was formed said: "I am not myself in possession of full details but I am convinced that the organization of the America Philippine company is a fortunate circumstance for all of us. It means an opportunity to secure, under fair conditions, the money that is needed to develop the Philippines. This company has ample capital and can secure as much more as is desirable. And it comes in a friendly spirit. It wants to join with the people of the islands in developing the resources of the islands and with mutual profit and benefit. I know that it has plans of profit sharing for its employes and that in itself is a good line on its liberal spirit and policy. Capital is our great need, not that which would exploit us for its benefit, but capital that would develop the country and benefit the country and the people of the country. We need money to finance our great agricultural industries and this company can furnish it. It is my personal intention to see that when the agents of this company arrive here they examine the problem of furnishing money for the great agricultural industries of the islands. I am pleased for another reason. The formation of this company at this time shows a confidence in the stability and future of the Philippines that will be reassuring to any who have permitted their faith to waver."

FAR EASTERN CABLES

EASTERN EXTENSION COMPANY'S PLANS

The 81st ordinary general meeting of the Eastern Telegraph Company (Limited) was held on November 13, at Electra House, Finsbury-pavement, Sir John Wolff Barry, K.C.B., presiding.

The Chairman remarked that the gross revenue for the half-year ended June 30 last exceeded that of any previous half-year, while the improvement shown continued to be well maintained. The gross revenue amounted, in round figures, to £746,700, or an increase of £74,300 over those of the June half of 1911. Message receipts showed an increase of £66,500, which was spread over practically every branch of the company's system. The introduction of deferred messages, to which he referred at their last meeting, had also created a new source of revenue, while not adversely affecting their ordinary fully-paid traffic. The total ordinary working expenses amounted, in round figures, to £306,000, or an increase of £14,700 over those for the corresponding half-year of 1911. The growth in the volume of traffic necessarily entailed more labour and naturally tended to generally increased expenditure under practically all headings. In view of the continued depreciation in the market value of their reserve fund investments a further sum of £50,000 had been transferred from the general reserve fund, and the amount set aside on account of investment fluctuations now stood at £300,000.

The increasing volume of business on the company's cables, which was proportionately greater than the increase of net revenue, pointed to the necessity of strengthening their cable capacity east of Suez, and the directors had in view the laying of new and important cables from that station eastward so soon as the necessary landing rights were granted. The Eastern Extension Company also proposed at the same time to strengthen their means of communication in the Far East. The new cables would, of course, involve considerable expenditure, which would be met out of the normal increase of revenue. Their reserves enabled them to deal with these matters without any anxiety regarding the usual dividends and bonus, or without increasing their capital.

THE YELLOW RIVER BRIDGE

On November 16 the last rivet was driven at the Hoangho bridge built by the Maschinenfabrik Augsburg-Nurnberg, near Tsinanfu. Amongst the guests present there were the Tutuh of Shantung, the Commander of the fifth division, the directors Ye and Meng of the Ministry of Public Works (representing the Minister), Messrs. Hsiao, Hsu and Liu, directors of the Northern part of the Tientsin-Pukow Railway, and Mr. Chao of the southern part, Captain Hopfner, representing the Governor of Kiautschou, members of the German Consulates of Tientsin and Tsinanfu, and of the British consulate of Tsinanfu, officers of the garrisons of Tsingtau, Mr. Cordes, Manager of the Deutsch-Asiatische Bank at Peking, Mr. Dorpmuller, Engineer-in-Chief of the Tientsin-Pukow Railway, and his staff, and many other guests with their ladies from Peking, Tientsin, Tsingtau, Nanking and Shanghai.

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CONTENTS

PAGE
The Salt Gabelle of China
Description of the Administration of the Salt Tax and Administration of the Salt Industry 295
Tokyo Industrial Exhibition 305
Indian Railways Earnings 305
Developing the Philippines 305
Far Eastern Cables 305
The Yellow River Bridge 305
The Short Cut to Peking 306
Philippine Mining Possibilities 307
Nomenclature on Chinese Railways 307
Capital Values in America 307
The Philippines and Prosperity 308
British and Chinese Corporation, Ltd. 308
Hydro-Electric Plant for Manila 308
Chinwangtao and its Future Outlook 309
Mineral Resources of the Philippines 311
Formosan Public Works 317
Hongkong's New Post Office 317
China's Finances 319
The Railways of Chosen (Korea)
Picturesque Route and Well-Appointed Trains 320
Locomotives 323
Philippines Post Works 324
Far Eastern Railways 325
Shanghai-Nanking Railway 325
South Manchuria Railway 325
Personal 326
Insurance 327
Tramways 328
Companies 328
Roads and Bridges 329
Mining 329
Iron and Steel Works 330
Harbours Waterways and Wharves 330
Building 330
Water Supply and Irrigation 330
Financial 330
Public Works 330
Light and Power Companies 331
General News 331
Naval 331
Shipping Companies 331
Proposals for Cement 332

THE SHORT CUT TO PEKING

China has opened her shortest cut from the entrepôt of Shanghai, on the sea, to the Capital of Peking. Early this month through traffic was opened from Pukow, on the Yangtsze River, (opposite Nanking), to Tientsin, and a journey is now possible from Shanghai to Peking in 40 hours as against five days by the previous shortest route. The only other line from the Yangtsze to Peking is that from Hankow, a length of some 755 miles. The newly opened line from Pukow to Tientsin is 626 miles, and to that has to be added the 73 miles from Tientsin to Peking and the 193 miles from Shanghai to Nanking, making the total rail distance from Shanghai to Peking some 892 miles, which is broken only by the Yangtsze river at Nanking. The first through trains to run over the line from Pukow to Tientsin left Tientsin and Pukow respectively on December 4, and two trains per week are now running from both places, leaving Pukow for Tientsin on Mondays and Fridays at 9.00 a.m., and arriving at Tientsin on the following days at 11.07 a.m.; and leaving Tientsin for Pukow on Wednesdays and Saturdays at 1.00 p.m., and arriving at Pukow on the following afternoons at 3.15 p.m. Sleeping berths cost $5, and the first class fare from Pukow to Tientsin is $42.10, the second class is $28.05, and third class is $14.05, the baggage allowed first class passengers being 150 catties, second class 100 catties, and third class 50 catties. The trains at present running are provided with dining cars and comfortable sleeping cars, and, with the exception of the break at Nanking, passengers may make the journey in comparative luxury.

Penetrating, as it does a vast agricultural plain the new line promises to be a source of abundant revenue to the Government, and should be equally as profitable as the excellent revenue producing lines in the northern system if efficiently conducted. The management of traffic, is, however, solely in the hands of the Chinese themselves, and is not supervised by foreigners as in the north, and this will be the determining factor as to whether or not the line will pay as it should do. Shippers of goods are already feeling the effects of a significant and startling development in transport company development on the southern section, and in the interests of efficient traffic management we feel it necessary to point out to the high officials of this portion of the railway, and the Ministry at Peking the necessity for a scrupulous regard for the interests of the shippers, and prospective shippers, of produce along the line.

The greatest care should be exercised to attract traffic to the line, but it would seem that so far nothing is being done to give the individual shipper in the south the facilities that he should have in order to influence him to use the railway for the transport of his goods. Instead, it is reported on the highest authority, he is confronted with aggravating and costly deterrents. Freight rates are in the hands of rival transport companies to such an extent that the usefulness of the line is being considerably impaired, and this report warrants the strictest investigation from those in authority. We do not believe that the responsible officials are aware of what is afoot to rob the Government of the just returns that it should enjoy.

It appears that there are a number of transportation companies, namely the Zai Tai Hun, Yu Toong, Yuan Chia, Yuen Kea, Wai Toong, Chong Kee, Sih Chen, Yah Lai, Tsin Nih, Toong Yuan, Yuen Lei, Tsih Yuen, Foh Shin, Lee Toong, Lee Shun, Poo Lee and Kwen Dal, and probably many others, already operating. They are alleged to pay some $3,000 each for a permit to carry on business. Many of the station masters, it is asserted, have shares in them, and, naturally, they favour the companies in which they are interested. Various lower grades of the railway service also participate in opportunities to squeeze, and this imposition is so heavy that several of the competing concerns have gone under. Unless a sufficient squeeze be given, the consignor is punished in many ingenious ways; trucks hired by him develop hot box by a strange accumulation of sand on the bearings, his goods are delayed and damaged, and he is speedily brought to a realization that the only way to secure transport is to surrender to the demands of those in whose power his goods eventually fall. In some respects, too, the transportation companies, owned, as they are by individual merchants, are used to kill commercial competition, and taking all in all the system is without a redeeming point.

It may be assumed that the higher Chinese officials connected with the railway do not know of the abuses that have developed as a consequence of the adoption of the principle of farming out transportation rights, and that, now that their attention is drawn to them, they will take steps to prevent the continuance of a system that must necessarily excite criticism. They must be particularly anxious to make the best possible showing on this new line, where no foreigners are employed in the traffic department, and comparisons, if things on the southern section continue in the present chaotic state, are certain to be made with the lines operated under foreign direction. There is an alternative system, based upon that in operation in India, which has been successfuly employed by the management of the Shanghai-Nanking Railway, and which might, with advantage, be adopted on the Tientsin-Pukow line. In brief, the principle of the method of booking goods is that everyone has a right to book his goods direct with the railway, but in India it is possible for merchants to employ one firm under power of attorney to book their goods and to do all their goods shed transactions for them. On the Shanghai-Nanking line what are called transporting agencies are allowed to act practically as attorneys for merchants who employ them, but in addition and separately, every facility is given to individuals to book goods for themselves and there is the Railway's own goods clerk to assist them. After goods are booked either by an individual or by a transport agency, they are taken in hand by the Goods Compradores who inspect, weight, examine (to see that the goods are what they are represented to be) check, supervise the loading, and seal the goods for despatch. In regard to goods that come by train they check the cars, supervise unloading and deliver them to the owners. It is also part of the duty of these compradores to canvass for the Railway, and introduce customers. Since these men have been employed the traffic has more than doubled and the Railway places great value upon them. The system works smoothly and there are no complaints. The distribution of the cars is under the direct control of the Deputy Traffic Manager, and transport facilities are given strictly in accordance with priority of application. All orders are placed in a book available to the public, and the cars are daily apportioned according to demands. The only trouble is that there is nothing like a sufficiency of cars.

If the higher officials of the Tientsin-Pukow Railway wish to avoid comparisons that can only result in an exposure of the ineptitude of Chinese management as compared to foreign, they will lose no time in insisting upon the adoption of a proper system of goods transportation. At the present time it is particularly important from the Chinese point of view that Chinese officialdom should be able to show substantial justification for their claim that foreign supervision can be profitably dispensed with.

PHILIPPINE MINING POSSIBILITIES

In another portion of this issue we publish portion of the excellent report issued by the Division of Mines of the Bureau of Science at Manila on the mineral resources of the Philippine Islands for the year 1911. It will be seen, that generally speaking, the mining industry is showing satisfactory, though not unduly rapid, development. Since that report was issued, however, there have been some striking developments in regard to gold-dredging in the district of Paracale. Of importance also is the completion and successful operation of the large modern mill of the Colorado Mining Company in Masbate. In connection with the Paracale district a remarkable rise in the price of the shares of the Philippine Exploration Mining Company had prepared the public mind for a sensational announcement. No surprise, therefore, was expressed when it was announced towards the end of November, that a run of 13 days of the Gumaus dredge had yielded the splendid return of 1,050 ozs. This is a record for production in the Philippines and a performance that ranks high in comparison with dredging records elsewhere. The bullion value of this yield was P. 38,050.

Mr. John S. Hord, the President of the Bank of the Philippines, who recently visited Paracale, with a party, speaks enthusiastically of what he saw, and predicts an extremely bright future for the mining industry in the Philippines. Mr. Hord believes that no less than P. 3,000,000 will be produced in the Philippines next year and he expects to see the insular possession take its place among the important gold producers of the world when the mining industry is fully developed.

The future of the mining industry in the Islands is dependent, like that of every other industry, upon the provision of adequate capital. Capital is notoriously timid. It is essential that security should be felt by those who are invited to invest their money in propositions in the Islands. The reports issued by the various bureaux of the Insular Government show that the inherent possibilities of the Philippines are practically boundless. The labour difficulty is being overcome. The excellent system of technical and other training has removed what was at one time the great stumbling-block to the advancement of the Islands. The Filipino is beginning to learn that labour has a greater reward than what is represented by the mere wage paid. He is learning that faithful and honest work gives the wage-earner a sense of self-respect that is entirely unknown to the idler, or to the man who scamps his work. It is to be hoped that Congress in their wisdom will do nothing to upset the *status quo* in the Philippines and that the present movement of progress in the Islands will not be arrested by any action taken with the mistaken object of advancing the interest of the Filipinos.

NOMENCLATURE ON CHINESE RAILWAYS

A highly commendable step has been taken by the Chinese Department of Railways in organising a special committee on railway nomenclature with the object of standardizing technical terms in the railway service. The committee has been subdivided into three groups, namely, Equipment, Engineering and Administrative. With the immense extension of railways throughout China, some definite system of nomenclature is evidently desirable. At present matters in this connection are in a state of chaos. This was inevitable in view of the fact that the railways in China were constructed under the supervision of foreign officials representing different European countries, America and Japan. There is a natural and perfectly excusable desire on the part of any official so employed to endeavour to secure the adoption of his mother-tongue in connection with the line upon which he is engaged. An indication of the difficulties that are caused by the desire of each nationality to push the claims of their own language in connection with the railways of China is to be found in the spelling of the names of the stations on the Peking-Hankow line. There the French translated the Chinese names of the railway stations according to French principle, whilst in North Manchuria the sign-boards at the stations are inscribed in Russian characters. This renders the latter uninformative to a large percentage of the foreign travellers, whilst the spelling of Chinese names on any other than the style adopted by the postal service or maritime customs is distinctly puzzling and inconvenient.

For many years past there has been an endeavour to devise some method of transliteration of Chinese characters according to one universally accepted standard. Looking at the matter from a commercial and particularly from a railway point of view, we learn with gratification that the Department of Railways has taken this highly important matter, small as it may seem to some, in hand. In view of the fact that English is admittedly the commercial language of the world, it would seem desirable and equitable that whatever system be finally adopted, the claims of English to priority should be kept steadily in mind. We shall await with great interest the report of this special committee.

CAPITAL VALUES IN AMERICA

According to the estimates of the national wealth of the United States made by the Bureau of the Census the value of the railways increased but little more than half as fast as the value of all property from 1890 to 1904.

From 1900 to 1910 the capital value of agriculture increased from (U.S. currency) $20,439,901,164 to $40,991,449,090; the capital value of manufactures from $8,975,256,000 to $18,428,270,000; the cost of road and equipment of the railways from $10,263,313,400 to $14.387,816,099.

The gross value of the products of manufacture increased from $11,406,927,000 in 1900 to $20,672,052,000 in 1910. The total operating revenues of the railways increased from $1,487,044,814 to $2,750,667,435. Thus the increase of 81.2 per cent. in the gross value of manufactured products was accompanied by an increase of 105.3 per cent. in manufacturing capital; while the increase of 85 per cent. in the total operating revenues of the railways was accompanied by an increase of only 40.2 per cent. in their cost of road and equipment.

The capital value of agriculture includes all farm property, land, buildings, implements, machinery, and live stock as enumerated by the census. The capital value of manufactures, as defined by the census, includes the value of property employed for the purposes of production, excepting rented property, but does not include any allowance for patent rights or good will. The capital value of the railways used in this comparison is the "cost of road and equipment" as it stands on their books and as reported by them to the Interstate Commerce Commission.

The report of the Bureau of the Census for 1900 indicated that the gross capitalization of the industrial combinations then in existence was more than twice as great as their capital value. The gross capitalization of the railways was about 12 per cent. greater than the cost of road and equipment in 1900 and 28 per cent. greater in 1910. The net capitalization of the railways, which is the amount for which they are responsible to the public, almost exactly coincided in 1910 with the cost of road and equipment.

Because of the peculiar nature of the industry, it is impracticable to arrive at a satisfactory and comparable estimate of the net return on the capital in agriculture. The greater similarity of the manufacturing and railway industries permits estimates of the return on capital that in a broad and general way are comparable. Approximately, the percentage of net return on the capital value of manufactures in 1900 was 17.119 per cent. and that on the cost of road and equipment of the railways 4.650 per cent. In 1910, when the capital value of manufactures had increased 105.3 per cent., the percentage of net return was 12.041 per cent., while on the cost of road and equipment of the railways, which had increased 40.2 per cent., the percentage of net return was 5.729 per cent. That is, in 1900 the percentage of net return on capital in manufactures was nearly four times as great as that on the cost of road and equipment of the railways; in 1910 it was over twice as great. In both cases the interest on capital is included in net return.

While these comparisons are subject to qualification, it is not believed that, were absolutely accurate and comparable data available, there would be any substantial change in the general conclusions.

These facts and figures which are based on official statistics of United States Government are from the recently issued Bulletin No. 39 of the Bureau of Railway Economics.

THE PHILIPPINES AND PROSPERITY

If hard times have struck the Philippines, customs statistics for the first four months of the present fiscal year do not show it. Every department of the bureau of customs reports an increase in collections during that time. Practically every month has seen an increase in every department.

The increase in collections on imports during the months of July, August, September and October, amounted to almost a million pesos as compared with the corresponding period of last year. A similar comparison shows an increase of P. 328,307 in collections on exports.

The total increase in collections over the same four months of last year amounts to P. 1,324,582. Of this sum, P. 80,000 is accounted for by increased collections on wharfage; P. 3,701 by increase in license collections; P. 1,817 by an increase in stamp collections; P. 1,236 by an increase in immigration dues.

The comparative figures for collections on imports and exports are given below:

1911	Imports	Exports
July	P. 1,020,386.94	P. 61,399.06
August	1,126,101.24	162,585.98
Sept.	1,105,301.10	146,421.89
October	1,100,193.74	97,953.34
Total	4,351,983.02	468,360.27
1912		
July	1,477,146.50	155,063.92
August	1,687,273.21	222,308.38
Sept.	1,109,655.53	179,248.94
Oct.	987,037.84	240,046.14
Total	5,261,113.08	796,667.38
Increase	909,130.06	328,307.11

Balabac collections for October are not included in this report.

BRITISH AND CHINESE CORPORATION, LTD.

The fourteenth annual ordinary general meeting of this Corporation was held on November 21, at the Cannon-street Hotel, London, E.C., Mr. C. C. Macrae presiding.

In the course of his statement the Chairman, referring with satisfaction to the record of the Corporation, said that it had financed and supervised the building of practically all the railways in China which had been constructed with British capital. These railways, the section from Shanhaikwan to Newchwang of the Imperial Northern Railways in the north, the Shanghai-Nanking Railway, and, through Chinese Central Railways, Limited, the southern section of the Tientsin-Pukow Railway in the Middle Kingdom; and, lastly, the Canton-Kowloon Railway in the south, had a total mileage of 837 miles, and were, he was told, as solidly and well constructed as any railroads in Europe or America. Then, in the way of financial results, the Corporation had throughout its 14 years of existence paid dividends averaging 10 per cent. per annum over the whole period, and had accumulated funds invested chiefly in liquid securities, which represented about twice the amount of its paid-up capital, after providing for the liabilities other than contingent calls on some of the investments amounting to something over £10,000, as shown in the balance-sheet. Turning to the balance-sheet, the general reserve account was increased by transfer from profit and loss account from £100,000 to £110,000. Debtors stand at £4,159, against £19,065. The profit and loss account showed the amount expended in general expenses to have been £7,884, against £8,099 in the preceding year. The revenue of the year was £25,261, against £33,092 in the previous year, or a reduction of £7,831. This was due to the revolution in China, which naturally prevented the doing of business with the Government, and not only prevented the completion of various pending pieces of business, but made it for the time being, unprofitable to negotiate fresh business.

Mr. C. S. Addis seconded the adoption of the report and the declaration of a dividend of 10s. per share, and this was unanimously agreed to without discussion. Sir David M. Barbour, K.C.S.I., was also re-elected to the board, and the proceedings then terminated.

HYDRO-ELECTRIC PLANT FOR MANILA

The following is from the *Manila Daily Bulletin* of December 7:—

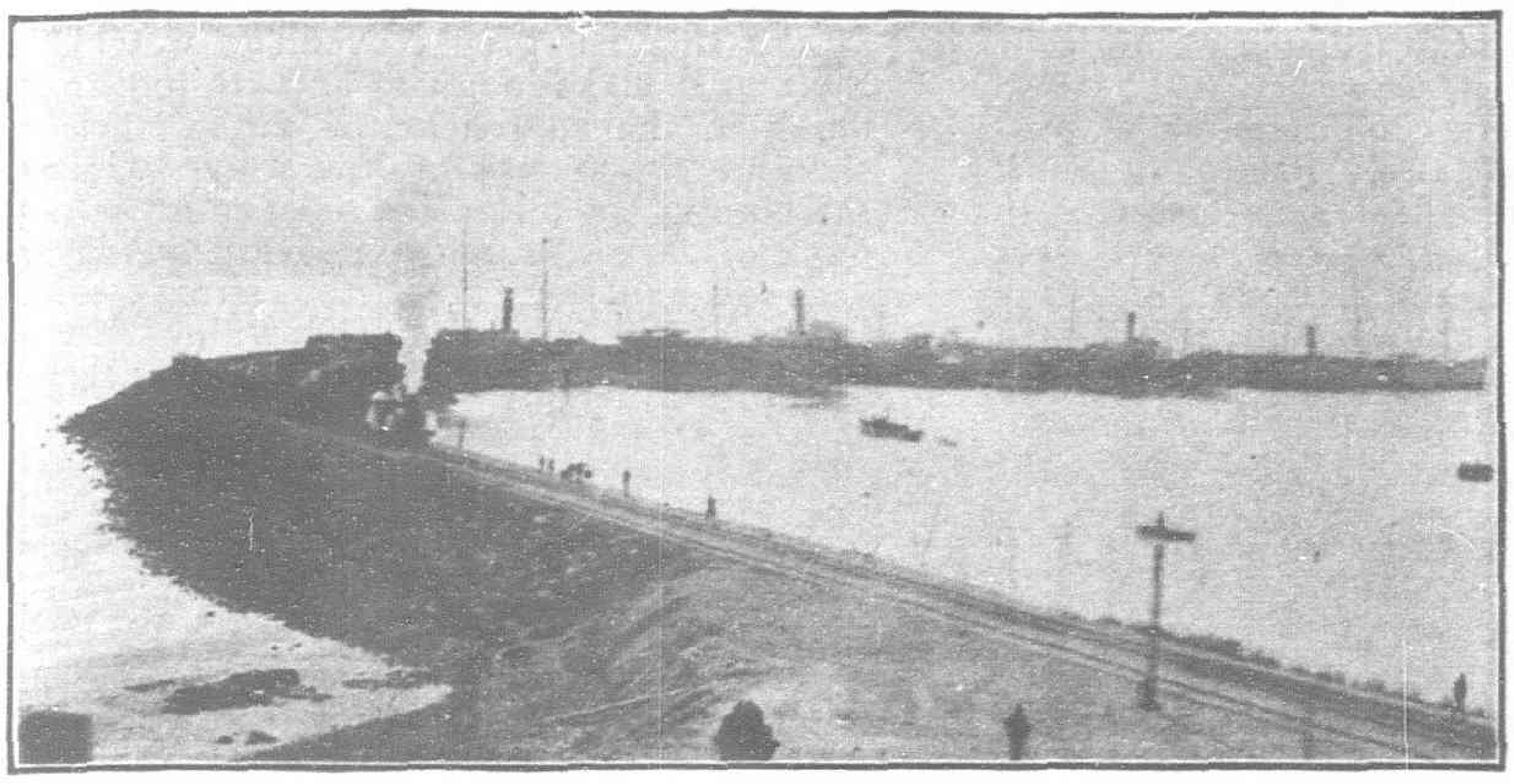
The favorable report of the expert who has just completed his investigations of a site for a hydro-electric plant near Pagsanjan is at hand and as a result the Manila Electric Railroad & Light Co. will invest the sum of P. 3,000,000, approximately, for the purpose of securing cheaper current for Manila and the suburban lines. This information has been received privately from New York and arose out of a discussion of the effect of the election of Woodrow Wilson on Philippine investments. The officials in New York have expressed their confidence in the immediate future of the Islands under the Democratic administration by declaring that they stand ready to instal a plant of the above character if the expert approves of the project in point of feasibility and increased efficiency in producing the juice.

The proposed site on the Caliraya River is distant about 60 miles from Manila. It has been considered most desirable in point of average flow of water and from its natural advantages as a location for an extensive plant to supply not only Manila but to accord Laguna and Batangas towns cheap light and power. Of course the expert will go into all the necessary details that the layman may overlook, but observations at that point for years indicate that the river would provide ample power, without interfering with the natural flow.

The construction will consist of a dam and runway with an outlet turning the water back into the river again. The initial unit installed will provide at least 33 per cent. more than is now necessary to supply light and power for Manila or 10,000 electrical h. p. with an efficiency in Manila of about 80 per cent.

CHINWANGTAO AND ITS FUTURE OUTLOOK

[BY R. R. C.]



VIEW OF BREAKWATER FROM THE BLUFF

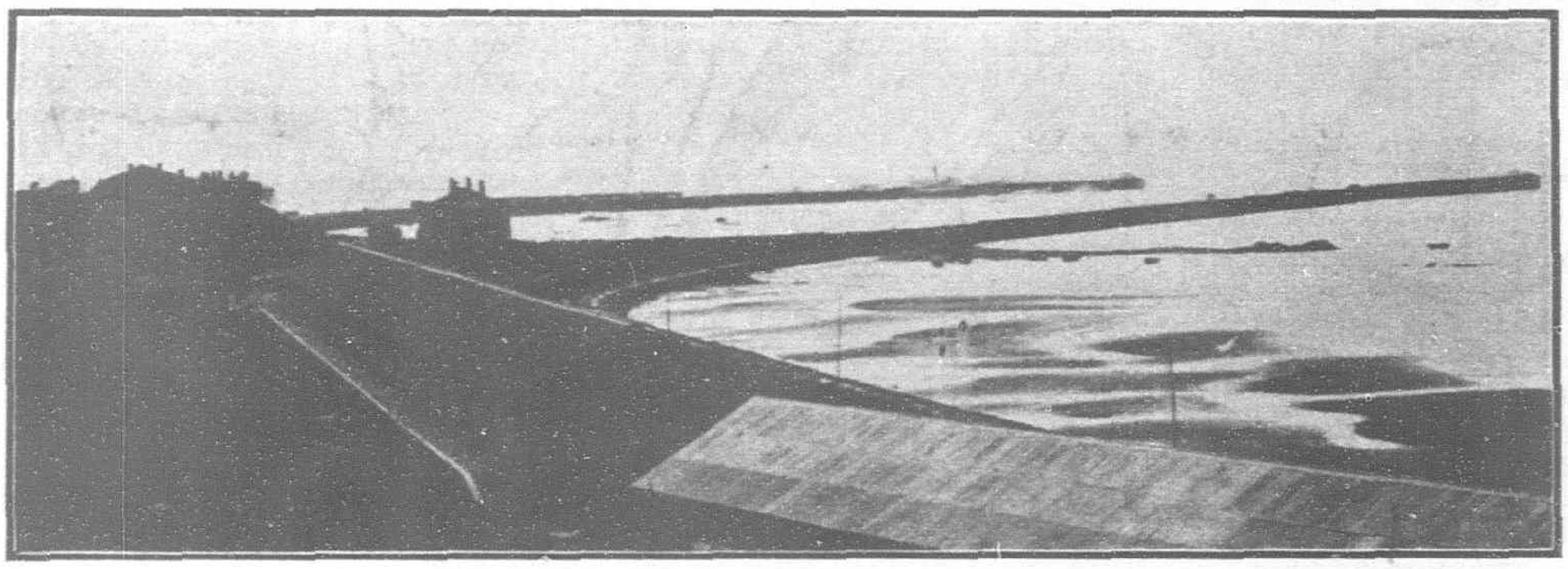
The composition of an article on Chinwangtao, though apparently a simple matter, is not unlike speculating upon the brood which will emerge from a sitting of eggs before our willing hen has had time to show what her incubating powers may be. In this case Chinwangtao represents the sitting of eggs; a kindly Fate takes the place of our willing hen; whilst a big busy port situated on the Western Shore of the Gulf of Liao Tung completes our analogy to show what Chinwangtao will some day surely become as soon as its period of incubation is over. We propose to speculate, if you will, upon the sea-port's rosy future. We are, fortunately, able to do this with some success owing to two causes which have combined to reduce its chances of failure to a minimum. One of these causes is so powerful that it has never been known to fail since the world began to spin. It has always acted, and it will continue to do so in the present as in the past; its name is Geography, for Chinwangtao is remarkably well situated from a purely geographical point of view.

The second cause is more local though none the less potential. Its potentiality lies hidden in the name of the Kailan Mining Administration. If we keep these two forces constantly before us, we shall see them constantly behind Chinwangtao, so that when we start cracking our statistical egg, we shall be able to digest it without an uneasy feeling. In a word we are convinced that Chinwangtao is going to blossom into one of the most important sea-port towns of North China, quite apart from any consideration of its sands or advantages as a Summer sea-side resort.

On these sands perhaps the word Blackpool will be written by the finger of Time some day, or may be our ears can already distinguish the new born cry of some mighty oriental Liverpool, bustling and busy, a centrifugal and centripetal force for the ships of the China Seas.

If Chinwangtao's proximity to the Mines, to the cornlands of Manchuria, and to the Government Railways of North China can not justify these rosy dreams, we know of no place in North China which can aspire to them, seeing that Chinwangtao is one of the few Northern ports which is not ice-bound and idle during the long, grey Winter months. Hitherto, we venture to think, the "Ping Line's" port has been more than a little hampered by one or two causes. Some of these are capable of immediate remedy. Others can only be removed by the healing hand of Time. Into this latter category we must put first of all the juxtaposition of Tientsin, which enjoys the advantage of being at the junction not only of the railways but also of the waterways of North China.

This juxta-position of the fast growing river port has certainly dwarfed the rise of the sea-port, and made it appear to the casual observer as though the latter were almost standing still. It is, however, the object of this article to prove the fallacy of that view, as well as to show by hard concrete facts that the rapid development of Chinwangtao is simply a question of time, plus judicious handling. Let us suppose that in the near future ocean going steamers should find it cheaper and more expeditious for them to go straight to Chinwangtao instead of stopping at Shanghai, will they not come to the Northern port? Let us suppose Chinwangtao takes advantage of its geographical position to sap from Newchwang the Southern import trade which passes Tientsin. In conjunction with the railway it could do so and will do so, but the railway is not going to come to terms until Chinwangtao compels it to do so by becoming more active through increased trade. This increased trade depends largely on the ability of the port authorities to attract more shipping. Then we shall see the railway offering in return some of the export trade—beans, etcetera—which of late years has left the country through Newchwang or Dalny.



GENERAL VIEW OF BREAKWATERS FORMING THE CHINWANGTAO HARBOUR

Then we shall see Chinwangtao fulfilling some of the dreams we have already foreshadowed; for it now handles the entire traffic of the Mines which puts it in a very strong position, besides which it enjoys the extra advantage of coaling facilities superior to any other Harbour on the whole China Coast.

On the other hand some of the oil import trade has lately migrated to Newchwang, because the Standard Oil Company sells its oil cheaper there than at any other port; whilst the Manchurian grain export trade has never yet been attracted to Chinwangtao for the simple reason that there are no buyers on the spot there. This, no doubt, has been partly due to Chinwangtao having hitherto been a foreign-managed port instead of a Chinese-foreign managed port. In this connection I feel sure that every old China "hand" will bear me out in saying that for any big undertaking to succeed in China both Chinese and foreigners must be mixed up in it. The foreigner stops a leakage of expenditure; the Chinese greases the wheels. Neither can stand in China without the other's help, but together they become as creative as they are dynamic, of course, that is to say, as business men. Now the awakening of Chinwangtao will come about through interesting Chinese buyers and merchants in the port just as much as through attracting ocean going vessels to make use of its Harbour and piers, but every catalysis depends upon the introduction of the catalyst, and so it is impossible to prophecy exactly when the transformation from slow growth to roaring activity will take place in this ice-free Northern sea-port. When that good moment arrives Chinwangtao will presumably still have the double driving forces of the Kailan Mining Administration and of geography behind it.

It will become a residential place. Money will circulate in proportion as business people come to live within a three mile radius of its bustling quays. And, lastly, riparian Tientsin will find herself before very long making a curtsey to her Cinderella Sister of the Gulf of

LOADING COAL AT CHINWANGTAO WHARF

Liao Tung. These being our prognostications for the future, we suggest, gentle reader, that you accompany us, for a stroll down to the Breakwater and see what there is to be seen in Chinwangtao to-day.

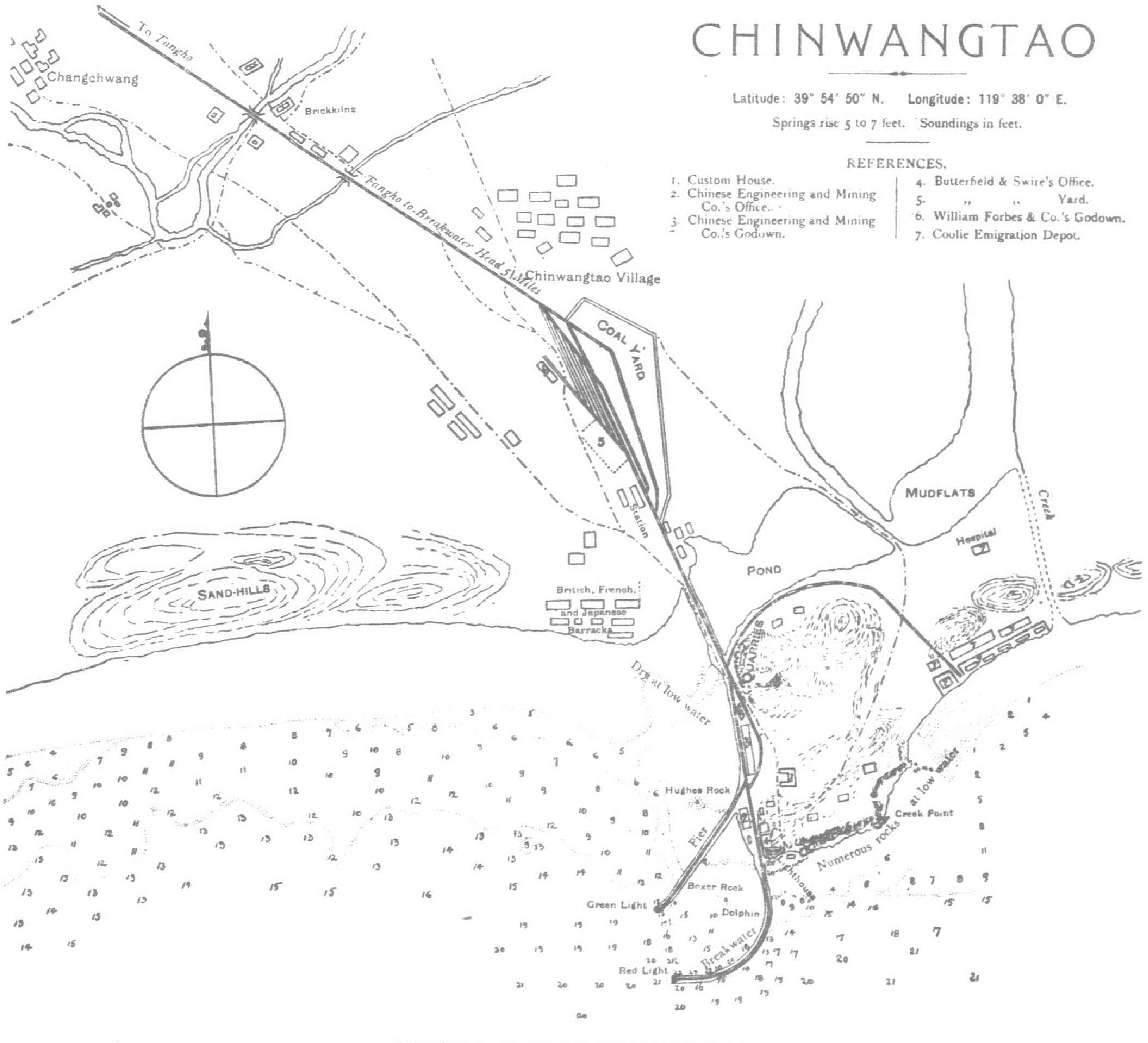
It is a raw cold morning in November, and amongst the other shipping we espy one vessel—a P. & O. flying the blue peter—which attracts our curiosity more than a little. It attracts us because we never expected to see it there, and because there is an air about it utterly unlike that of the three or four merchant steamers loading up with a coal or bricks or some other cargo for warmer Southern ports. It is a hired transport, and on hurrying towards her before she sails, we arrive just in time to say "good bye" to a regiment of British "Tommies" who are evidently very loth to turn their backs for ever upon the flowery land and upon the friends they made there. We wave our handkerchiefs. The vessel glides off. Then we turn to examine the breakwater upon which we are standing, and find it runs out first of all 650 ft., at right angles to the shore, after which it curves Westward to a radius of 750 feet, its extremity being 980 ft. long and tangential to this curve. The first 650 feet is a rubble embankment wide enough for two railway tracks laid to 14-foot centres. The remaining portion is a framed wooden structure with parallel rows of piles put down every ten feet at right angles to the centre line of the breakwater. On the inner side, steel joist piles, spliced to jarrah tops to form the superstructure, are spaced at 5-foot centres and driven down to rock through 16 feet of yellow clay, sand, and decomposed rock.

Immediately behind these piles we notice a number of 80 lb. steel rail piles driven along the face to retain the rubble stone-work which forms the hearting of the structure. The piles are braced together and form a strong support to the railway tracks which run along the top of the breakwater on stout longitudinal timbers. At the quay level this breakwater is 66 ft. wide. On the seaward side we notice it has a flat rubble slope covered with 5-ton concrete blocks serving doubtless as a protection against heavy gales. True, the work as a whole does not appeal very strongly to our aesthetic senses, but we feel nevertheless that it is durable, strong, and see that it is well equipped with cranes and trollies to ensure rapidity in loading any vessels which may take up their berths alongside.

Even as we stand watching, two or three vessels are unloading close at hand, whilst another is being loaded at the structure just across the Harbour which we rightly take to be the pier. From where we are standing it would seem as though this pier were constructed very similarly to the breakwater. It starts at a point 400 feet to the North West of the landward end of the breakwater, and projects out in a South Westerly direction into the sea. Between the breakwater and this pier the Harbour mouth is 907 feet across, and the area of water embayed between these two structures is altogether something nearly approaching 30 acres of smooth anchorage, safe for loading, safe for unloading, and very attractive to the storm-tossed skipper who has all but lost his ship,

We are quite satisfied with what we have seen so far, but at the same time we came out to ask questions, and are not prepared to go back to breakfast until we have gleaned all the information there is to be had. "I wonder what the bottom of the Harbour consists of?" we hear you ask as we gaze thoughtfully down at the sluggish grey November waters. We thereupon make inquiries and are told that the depth in the approaches is 22 ft. gradually shoaling to 20 feet at low water, whilst the sea bottom has all over it a layer of a foot or more of very soft mud. Beneath this layer of very soft mud there are various strata commencing with 5 feet of mud and yellow clay; then come 2 feet of stiff yellow clay and stones; then five feet of very soft clay and sand, and finally 2 feet 6 inches of decomposed rock and lime stone. Inside the Harbour the depth varies from 18 feet to 22 feet at low water, but the tides are weak and irregular, seldom exceeding half a knot per hour, whilst the rise of the tide is usually somewhere well between five and seven feet.

Our informant goes on to tell us that there is no necessity to make use of buoys because vessels can safely lie alongside the wharf and pier, as indeed we see for ourselves they are doing at this very moment. The only dredger employed is a small "Priestman's" Grab. This works for only nine months of the year—from the middle of March to the middle of


CHINWANGTAO
Latitude: 39° 54′ 50″ N. Longitude: 119° 38′ 0″ E.
Springs rise 5 to 7 feet. Soundings in feet.
REFERENCES.
1. Custom House.
2. Chinese Engineering and Mining Co.'s Office.
3. Chinese Engineering and Mining Co.'s Godown.
4. Butterfield & Swire's Office.
5. " " Yard.
6. William Forbes & Co.'s Godown.
7. Coolie Emigration Depot.
Changchwang
To Tangho
Brickkilns
Tangho to Breakwater Head 5¼ Miles
Chinwangtao Village
COAL YARD
5
Station
SAND-HILLS
British, French, and Japanese Barracks
Pond
Mudflats
Creek
Hospital
Quarries
Dry at low water
Hughes Rock
Pier
Creek Point
Numerous rocks at low water
Boxer Rock
Dolphin
Green Light
Red Light
Breakwater
Lighthouse

GENERAL PLAN OF CHINWANGTAO

December, and during this period the estimated quantity of material dredged is 3,500 cubic yards per month at a cost of about 21 Mexican cents per cubic yard. At present the breakwater can accommodate altogether five ships, the available space for berthing being as follows:—

Berth	No. 3	for Vessels	275 ft.	long has	18 ft.	at low water
..	No. 4	,,	330 ft.	,,	20 ft.	,,
..	No. 5	..	500 ft.	,,	21 ft.	..
..	No. 6&7	..	600 ft.	..	21 ft.	..

The pier, on the other hand is less commodious, and can only accommodate two vessels of 310 feet, one on its outer and one on its inner faces. These two berths are numbered respectly No. 1 and No. 2. They have each approximately 18 ft. at low water, but all the berthing places enjoy the extra advantage of a soft mud bottom so that vessels of even greater depth can face the possibility of grounding at low tide without fear of getting their bottom knocked out by hard, unsympathetic rocks.

However, even this assurance would seem hardly to satisfy the present energetic owners of the port, for they are now considering the possibility of effecting its improvement by dredging the Harbour approach to 23 ft., and by deepening the berths alongside the breakwater to 25 ft. at low water. Such a scheme will increase more than ever the facilities for berthing steamers promptly. The outer berths will then be occupied by ocean going steamers and worked independently without causing delay or inconvenience to vessels berthed in the inner ones. Then again the Harbour is so well protected that berthing operations can always be carried on in any ordinary weather.

"What then," we hear you ask, "is to prevent this place going ahead?"

Our answer is: "Nothing."

It is well situated midway between Mukden and Peking. Newchwang lies to the Eastward at a distance of 222 miles. Tongshan and Tientsin lie to the West: the former at a distance of 84 miles, while the latter is 165 miles away, measuring space by the only long distance measure left to us, by mobility, that is to say by the railway line.

Now we must wait for Chinwangtao to increase in importance and develop in proportion to the growth of factories and trade and industries along the whole Coastland from Taku to Shanhaikwan. Along that Coastland stretches the best coal field of North China. We all know from studying the development of other countries what wonderful powers coal possesses for incubating new industries, and for encouraging new factories. We all know equally well that Industry and Commerce go hand in hand. Therefore we say once more as we said before, the port of Chinwangtao is going to become not only the centrifugal but also the centripetal commercial force for the ships of the North China Seas, though how long the egg will take to incubate we cannot, at present, tell.

MINERAL RESOURCES OF THE PHILIPPINES

Retrospect for 1911

The Division of Mines, Bureau of Science, Manila, has issued a valuable report upon the Mineral Resources of the Philippine Islands for the year 1911, from which we take the following:—

The status of the mineral industry in the Philippines at the close of the year 1911, is more satisfactory both in metallic and nonmetallic fields than at any time in the past. Extensive and careful investigation with conservative investment is the characteristic and most gratifying feature of the year's progress. Actual mining operation has been retarded by the typhoon of October, 1911, and by unsettled conditions in China, the residence of many investors in the Philippine gold and coal properties.

The statistics of the mineral production of the Philippine Islands for the calendar year 1911, and information concerning the different mining districts up to May 1, 1912, have been gathered through the coöperation of the mining operators and the bureaux of the Government. The annual reviews of the different mining districts deal primarily with the local progress, but are intended to bring out also the essential general features of the districts for the benefit of readers who are not familiar with Philippine mining.

SUMMARY OF THE MINERAL INDUSTRY

The production of minerals in the Philippine Islands does not show a marked increase over that of the preceding year, still there has been a steady advance in the industry. It has been proved beyond doubt that the Philippines are potentially rich in economic minerals.

The experience of the past year has shown more clearly than ever that one of the most serious handicaps to the Philippine mining industry is the difficulty in obtaining adequate capital.

Gold.—Progress in gold mining has been much interfered with by severe storms, but certain distinct advances have been made. Large companies have been formed and several new dredges are being built.

The first marked success in gold mining and milling has been attained at the Colorado mine in Masbate.

Iron.—In the iron fields of the Eastern Cordillera of Luzon, native mining and smelting continues as in past years. The existence of these magnetite and hematite deposits, together with the more promising one of hematite near Mambulao, Ambos Camarines, has caused considerable interest recently among capitalists, who are investigating the possibilities of these natural resources.

Coal.—The East Batan Coal Company mine has been in operation throughout the year. In Polillo development work is being done on two properties, one on the Guinibauan River and another on the Anabauan River. The arrival in Manila of the Otto gas-producer plant, ordered for the Bureau of Science and especially designed for utilizing Philippines coal, marks an event of importance in the coal industry here.

Cement, etc.—Several localities have been examined during the year by companies contemplating the manufacture of Portland cement. Complete field and laboratory investigations with burning tests have shown exceptionally favorable materials and locations. The increasing consumption of structural materials and road metal has resulted in a remarkable advance in the quarrying industry, while the manufacture of sugar *tenajas* and brick for sugar ovens by the native clay-workers has experienced unusual growth.

Some resources, the development of which is promising and which would greatly benefit the Philippine Islands, are the following:

(1) The Cebu, Sibuguey Bay (Mindanao), and Polillo coal fields.
(2) The manufacture of Portland cement.
(3) The manufacture of sand-lime brick.
(4) The iron deposits in Mambulao Bay, Ambos Camarines.
(5) The oil field of Tayabas.
(6) The manufacture of vitrified brick.
(7) The various sulphur and salt deposits.
(8) The asbestos deposits of Ilocos Norte.
(9) The lead deposits of Batangas Peninsula.

THE AROROY MINING DISTRICT, MASBATE

[By Paul R. Fanning.]

The production of gold in the Aroroy mining district, Masbate, showed an increase from practically nothing in 1910 to 72,500 pesos in 1911. In 1910 no mills operated, while in 1911 the Colorado mill began operations and the Tengo mill resumed work for a short time.

The completion of the Colorado mill and the beginning of successful work in October, 1911, is one of the most important events in the history of mining in the Philippine Islands. This mine is now averaging 60,000 pesos per month, which if continued throughout 1912 will give a production of some 720,000 pesos, or over double the total gold output of the Philippines during 1911. There is reason to feel confident that this large production will be maintained for many years to come.

The production of companies is given in the following table:

Production of the Aroroy district.

Company.	Pesos.
Colorado Mining Co.	70,500
Tengo Mining Co.	2,000
Total	72,500

Colorado Mining Company

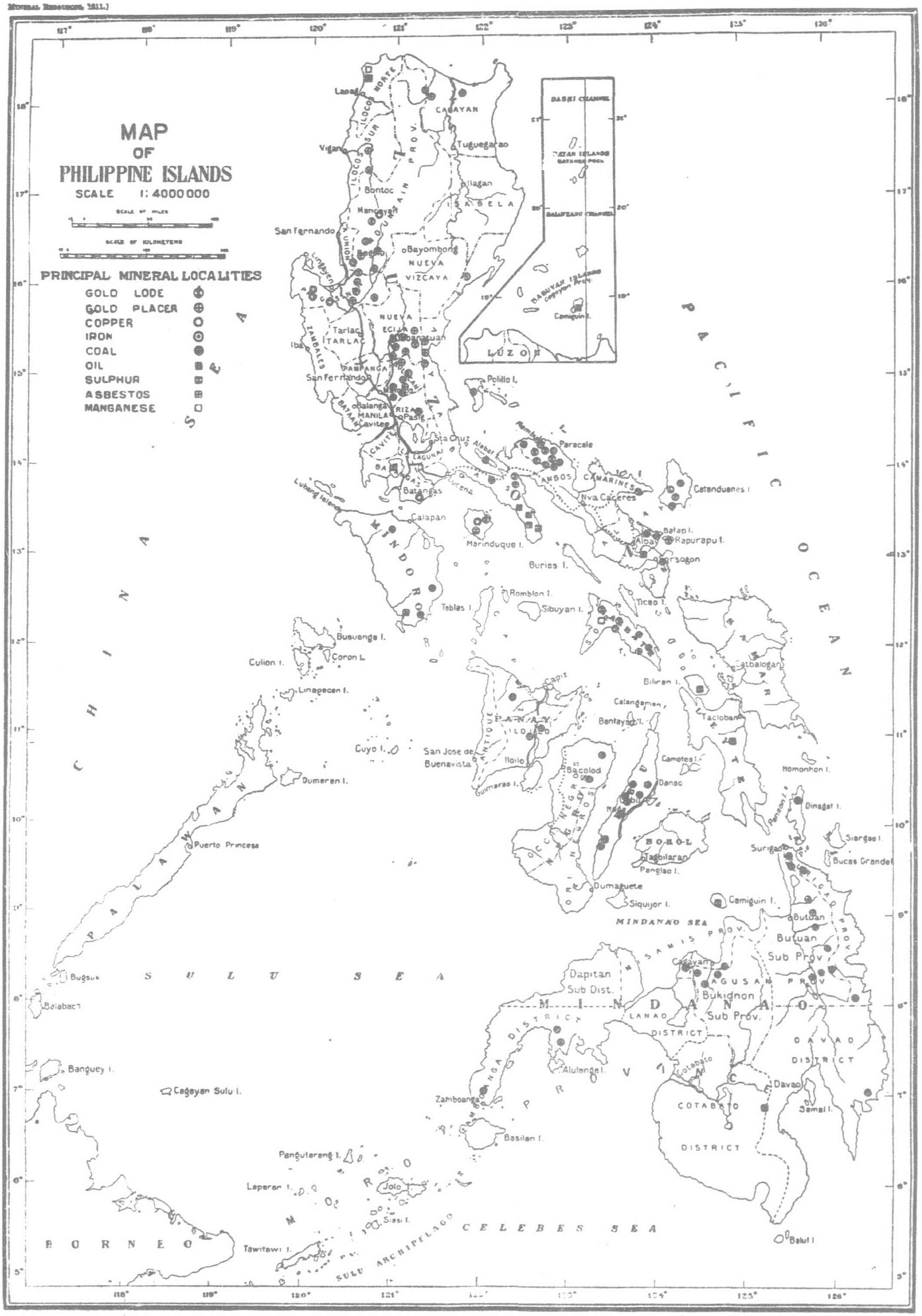
During the first part of 1911 the Colorado Mining Company continued active development work to prepare the mine for the 20-stamp cyanide mill which was nearing completion. During 1911 the mill operated irregularly for less than two months, but steady production did not begin until the last of December.

The Mine.—The vein averages 4 meters in width, strikes south 45° east, and dips 70° to the northeast. The vein matter consists of quartz with some calcite and manganese. The ore is stated to average 20 pesos per ton.

The inclined shaft now reaches a depth of 146 meters, which is the greatest depth penetrated in the district, perhaps in the Philippine Islands. As stated by the company, the average values show only a nominal decrease from the top to the bottom of the shaft, and the bottom ore is said to have a value of more than 16 pesos per ton. It is to be noted that this ore is still above the level of the permanent ground-water, and hence in the oxidized zone. The indications are that the zone of oxidation should extend to a depth approximately equal to the level of the Guinobatan River; that is, 100 meters below the present bottom of the shaft. It is probable that pay ore will be found to this depth, and it is possible that the zone of oxidation may extend to an even greater depth. Whether or not a zone of enriched ore will be found at this depth is too problematic for present consideration, although the presence of manganese in the ore, as has been repeatedly pointed out, is highly suggestive of a zone of richer ore close to the level of the permanent ground-water.

The mine has been opened up by means of two main adits, 53 meters apart vertically; the upper, or No. 1, adit is 30 meters below the highest point in the outcrop. Two intermediate levels have been run, and various cross-cuts and up-raises put in. During 1911, a draft was run next to the hanging wall parallel to and connecting with No. 1; the main, or No. 2, adit was continued 80 meters farther to the northwest; the upper intermediate level was run for a distance of 120 meters; the lower intermediate level was run for a distance of 180 meters; and the shaft was sunk 30 meters

Mineral Resources, 1911.]



Reduced from Map of Philippine Islands by John Bach

MAP OF MINERAL DEPOSITS IN THE PHILIPPINES to a total depth of 146 meters. In all some 800 meters of work was performed, besides preparing the ore bodies for stoping.

In stoping the ore, the square-set system of mining has been used, but owing to the high cost of timbering it is probable that some modification of the method will be adopted. The mine is surrounded by a forest of magnificent hardwood trees, but the cost of cutting, transportation, and dressing is very high. The shipment of dressed pine from the United States to supplant native timbers is being considered as an economical measure.

THE MILL.—The 20-stamp cyanide mill is of Traylor design and is of the all-sliming type, crushing in cyanide solution. The striking feature of the practice is that the gold solutions from the Dorr thickner pass to the zinc-boxes without filtering in the Oliver filters.

The ore is delivered from the second level of the mine to the storage bins, and thence to the mill by means of a 2-bucket aerial rope tramway 320 meters long.

Crushing.—The ore from the buckets passes to a 3 by 8 foot grizzly; the oversize is crushed in a 10 by 20 inch Blake crusher and passes to the bin. The ore is fed into four 5-stamp batteries by Challenge feeders. Lime, which is prepared in a kiln near the mine from a local deposit of calcite ore, is added at the batteries. The 20 stamps, weighing 1,250 pounds each, drop at the rate of 100 per minute; the height of drop is about 8 inches, and a 4-inch discharge is used. The ore is crushed in solution of a strength varying from 0.12 to 0.20 per cent. potassium cyanide. A capacity of 4.5 tons per stamp per twenty-four hours is obtained when a 6-mesh screen is used. The pulp, which has a thickness of about 6 parts of solution to 1 of ore, passes to a Dorr classifier where the sands are raked out and delivered to two 5 by 18 foot tube mills. These mills are of Traylor manufacture, with trunnion bearings and spiral feed. A speed of 28 revolutions per minute is used. The lining is of the El Oro type. At first Danish pebbles were used entirely, but at present some of the harder quartz from the mine is added. The discharged pulp, which contains about 40 per cent. moisture, passes to a bucket elevator and is returned to the Dorr classifier.

Screen tests showed the following:

Screen Tests

Screen mesh.	Tube-mill dis-charge.	Classifier sands.	Classifier slimes.
	Per cent.	*Per cent.*	*Per cent.*
On 10	0.14	0.85	none
On 20	1.53	10.05	none
On 40	8.52	19.50	none
On 60	31.29	25.55	none
On 80	19.33	14.85	none
On 100	15.32	12.25	none
On 150	7.55	5.70	6 to 12
On 200	5.80	0.65	8 to 16
(–) 200	10.52	63.00	remainder

It can be seen that the classifier collects 63 per cent. of (–) 200-mesh product along with the sands. This is poor classification and results in extra tube-mill work. However, the advantage of using a classifier, which delivers a thick product for the tube-mill, compensates somewhat for this disadvantage.

Treatment of the slimes.—The slimes, having a thickness of about 9 to 1, pass from the Dorr classifier to a 20 by 14 foot Dorr thickener. The overflow from the thickener passes to a clarifying tank, thence to a gold-solution tank, and thence to 3 sets of 7-compartment zinc-boxes.

The pulp from thickener passes to two 12 by 40 foot Pachuca tanks connected in series. The central columns of the Pachucas discharge at the surface, and an air pressure of about 32 pounds is used. The solution has a strength of from 0.12 to 0.20 per cent. potassium cyanide, and the pulp has a thickness of about 1.5 to 1. After agitation in the Pachucas, the pulp passes by launder to a second Dorr thickener. Previous to entering the thickener, the pulp is diluted with solution from the Oliver filters. The overflow from the thickener passes to a clarifying box, and thence to 2 sets of 7-compartment zinc-boxes. When first operated the thickeners gave trouble owing to the great amount of slimy foam which overflowed with the gold solution. This difficulty was overcome by removing alternate bolts on the rim launder and drawing off the solution just below the surface free from foam. The foam is drawn off separately by a central launder and passes to the Traylor agitator.

The pulp from the thickener passes to a 20 by 8 foot Traylor agitator, which prepares the pulp for two 11 by 6 by 8 foot Oliver filters. From the filters the gold solution passes by means of wet and dry vacuum pumps to a 12 by 10 foot storage tank. From here part of the solution is pumped to dilute the pulp entering the second Dorr thickener, and the remainder is relayed to the 28 by 14 foot solution storage tank at the top of the mill. None of the solution from the filters passes directly to the zinc-boxes.

Solution of the gold.—As noted, a feature of the practice is that the gold solution is taken from the Dorr thickener for precipitation rather than from the Oliver filters. The reason for this lies in the fact about 80 per cent. of the gold goes into solution before the pulp reaches the Pachucas. It would seem from this that the greater part of the gold is very fine, easily liberated, and readily attacked by the cyanide solution. The presence of manganese probably has been instrumental in producing this condition of the gold. Some coarse gold and gold bound up in the minerals are present, and the Pachucas give the added time necessary for their solution.

Precipitation and clean-up.—A general clean-up is made every two weeks, and the bullion is melted once a month. The zinc fines are treated with sulphuric acid, and the gold slimes

STATISTICS OF PRODUCTION.

TABLE I.—*Mineral products of the Philippine Islands for the calendar year 1909-1911.*

[Values in pesos[1] Philippine currency.]

Products.	1907	1908	1909	1910	1911
Metals:					
Iron	([2])	[3]17,500	[3]31,078	[3]20,023	[3]29,159
Silver[4]	97	2,750			
Gold	187,647	434,500	495,194	308,860	379,906
Copper		52			600
Manganese			12,500		([5])
Total value of metals	187,744	454,802	538,772	328,883	409,665
Nonmetals:					
Coal	26,799	77,166	197,184	176,255	[6]130,000
Clay products	([2])	421,628	422,840	430,000	450,000
Lime	([2])	20,000	69,656	70,000	90,000
Sand and gravel	([2])	206,360	325,050	293,456	477,344
Stone	([2])	146,930	311,177	372,575	655,795
Salt	([2])	([2])	375,368	380,000	550,000
Total value of nonmetals	26,799	875,084	701,275	1,722,286	2,353,139
Grand total	214,543	1,329,886	2,240.047	2,051,169	2,762,804

[1] One peso Philippine currency is equal to 50 cents United States currency.
[2] Statistics not available.
[3] Value of manufactured product, 73.0 metric tons of metallic iron.
[4] Some silver is generally found alloyed with Philippine gold; none is mined separately.
[5] No production reported for 1911, but the known deposits are receiving careful attention.
[6] 20,000 metric tons at 6.50 pesos per ton.

TABLE II.—*Comparative statements of the gold production by provinces for the calendar years* 1907-1911.

[Values in posos[1] Philippine currency.]

Province.	1907	1908	1909	1910	1911
Ambos Camarines	4,133	143.532	216,701	144,900	198,000
Mountain Province	160,699	278,474	256,400	95,950	66,406
Sorsogon (Masbate)	22,815	1,330			70,500
All other provinces		11,164	22,093	68,000	45,000
Total	[2]187,647	434,500	495,194	308,860	379,906

[1] One peso Philippine currency is equal to 50 cents United States currency.
[2] The total gold production for 1907 has been erroneously stated as 141,194 pesos in the past.

are washed, steam dried, and melted in a gasoline, tilting, crucible furnace. The bullion is shipped to Manila, where the International Banking Corporation advances value based on the company's own assay. The bank ships the bullion to San Francisco, and later makes adjustments with the company.

Cost of operation.—The cost of mining and milling at the Colorado Mine has been placed at less than 8 pesos per ton, and there is some reason to believe that this figure will be reduced under the conditions of steady operation. The fact that the cost of mining is moderately low would lead to the belief that, considering his low salary, the Filipino is an efficient miner. It is to be remembered, however, that the vein is of such width as to permit stoping on an economical scale. Furthermore, most of the ore is sufficiently soft and fractured so as to be readily mined without the use of dynamite. On the other hand, the cost of general supplies is somewhat high, although lower than at many mines in the United States not situated directly on a railroad. The anomalous condition of having a timber problem in the midst of a great forest has already been discussed, and this problem will become more acute as the more adjacent trees are removed.

Owing to the excessive cost of the mill, the original investment is very large in comparison with the capacity, and this means a higher cost per ton than usual owing to the factors of depreciation and interest. For this mill these two factors alone mean a cost of about 1 peso per ton, and it is possible that this amount has not been included in computing the total cost of operation.

It was the belief of the writer when first coming to the Philippines that the depreciation for this country would be especially high, and experience in many cases has justified this belief. However, there are instances where, under good construction, the depreciation has been no greater than in the United States. The destruction of buildings under the attacks of white ants or other insects does not always seem a serious consideration, as there are numerous buildings, properly constructed, which have lasted, for many years; certainly many years longer than the probable life of any mine. It is also known that white ants do not attack timbers which vibrate under the shocks of machinery. The construction work on the Colorado mill is of such order that it appears unnecessary to allow an excessive depreciation charge.

THE EASTERN MINE.

The Syndicate Mining Company which holds a bond and lease on the Eastern Mine continued active development work throughout 1911, and by the end of the year had greatly increased the actual ore in sight. The workings of the mine, and the character of the ore, have already been accurately described, and as stated by Eddingfield, the mine "presents a possibility of having over 100,000 tons of ore averaging 9 to 10 dollars per ton."

The development work has now reached the stage where it would seem that the erection of a mill is warranted. In conformity with this plan, a sample of ore was submitted to the division of mines, for testing, and the results obtained were most encouraging. Through the kindness of Judge Geo. N. Hurd the results of these tests are here given in brief.

TESTS ON EASTERN ORE.

The ore.—The ore consists of quartz and calcite with some manganese (wad, oxides, etc.). Sulphides are sub-ordinate. The value of the sample is 54 pesos per ton.

Amalgamation test.—At 20-mesh, 16.4 per cent. can be saved by amalgamation where stamps and outside plates are used.

Concentration test.—At 20-mesh the ratio of concentration was 100 to 1. There appears no benefit nor object in concentration on this type of ore.

Cyanidation tests.—At 20-mesh, division was made into sands and slimes, and the slimes showed a high extraction. With the sands only a moderate extraction was obtained.

Table A

Cyanide tests on sands and slimes.

Products.	Assay heads	Assay tails.	Extraction.	Time.	Strength of solution	Consumption per ton of ore.	Method.
	Pesos.	*Poses.*	*Per cent.*		*Per cent.*	*Pounds.*	
Sands	50.84	24.00	55.5	2 days	0.09	0.8	Leaching.
Sands	50.84	15.90	70.4	5 days	0.28	1.0	Leaching.
Slimes	76.06	6.70	88	12 hours	0.26	0.8	Agitation.

Table B

Fine-grinding cyanide tests—ore through 100-mesh.[1] *(Showing effect of time.)*

Assay heads.	Assay tails.	Extraction.	Time,	Ratio of solution to ore.	Strength of solution.	Consumption per ton of ore.
Pesos.	*Pesos.*	*Per cent.*	*Hours.*		*Per cent.*	*Pounds.*
54.00	13.60	74.4	1	1 : 1	0.28	0.5
54.00	10.00	81.5	2	1 : 1	0.28	0.8
54.00	6.60	87.7	4.5	1 : 1	0.28	0.8
54.00	6.60	87.7	6	1 : 1	0.28	0.8
54.00	6.20	88.4	16	1 : 1	0.63	0,8

Fine-grinding cyanide tests—ore through 100-mesh.[1] *(Showing effect of thickness of pulp.)*

Assay heads.	Assay tails.	Extraction.	Time.	Ratio of solution to ore.	Strength of Solution.	Consumption per ton of ore.
Pesos.	*Pesos.*	*Per cent.*	*Hours.*		*Per cent.*	*Pounds.*
54.00	6.60	87.7	22	1 : 1	0.28	0.8
54.00	4.24	92	22	2 : 1	0.26	0.8
54.00	4.00	92.6	22	3 : 1	0,26	0.8
54.00	3,20	94	22	4 : 1	0,26	0.8

[1] The ore was agitated in bottles, and in all cases lime was added.

Screen Test at 20-Mesh.

Products.	Weight.	Gold.	Assay.
	Per cent.	*Per cent.*	*Pesos.*
20-mesh original....	100	100	54.00
On 100-mesh........	80.2	73.37	50.84
Through 100-mesh..	19.8	27.72	76.06

This test shows that when crushing through 20-mesh, approximately 80.2 per cent. can be considered as sands and 19.8 per cent. can be considered as slimes. As is so generally true, the slimes assay considerably higher per ton than do the sands, although the slimes actually contain only 27.72 per cent. of the gold.

Where the ore is crushed through 20-mesh and divided into sand and slimes the following was shown:

(See Table A)

It is apparent from this table that a much better extraction can be obtained on slimes.

The ore was next put through 100-mesh by means of a tube-mill and the following tests were made:

(See Table B)

As shown by the first table, the extraction increases from 74.4 per cent. in one hour to 87.7 per cent. in six hours. Further time increases the extraction only a slight amount. As shown by the second table, the extraction increases from 87.7 per cent. in a 1:1 pulp to 94 per cent. in 4:1 pulp.

To ascertain the effect of amalgamation previous to cyanidation, a split of the same tube-milled sample was amalgamated and showed 44.4 per cent. extraction by amalgamation. The tailings were then cyanided without further crushing and showed 95.4 per cent. extraction in twelve hours where the strength of solution was 0.26 per cent. KCN and the ratio of solution to ore was 3:1. The consumption in this test was 0.4 pound of cyanide per ton of ore. The conclusion is that amalgamation previous to cyanidation will give a greater extraction in the same time; or, in other words, will give the same extraction in less time

The ore was next put through 150-mesh by means of a tubemill, and cyanide tests gave the following results:

(See Table C on page 316)

As shown by this test from 94 per cent. to 96.6 per cent. extraction can be obtained when the ore is put through 150-mesh, whereas about 90 per cent is obtained under the same conditions when the ore is put through 100-mesh.

Table C

Fine-grinding cyanide tests—ore through 150-mesh.

Assay heads.	Assay tails.	Extraction.	Time.	Ratio of solution to ore.	Strength of solution.	Consumption per ton of ore.
Pesos.	*Pesos.*	*Per cent.*	*Hours.*		*Per cent.*	*Pounds.*
54.00	3.20	94	12	2 : 1	0.26	1.6
54.00	1.82	96.6	12	2 : 1	0.26	1.2

It is evident from these tests that the ore is well adapted to cyanidation where the all-sliming process is used. It has been shown that greater than 90 per cent-extraction can be obtained, that the time required is moderate, and that the consumption of cyanide is low.

In view of the tonnage developed and of the high extraction possible with a suitable mill, it would seem that this mine is in a position to command the capital necessary for the erection of a plant.

OTHER PROPERTIES.

The Tengo Mining Company did a little development work and operated the mill for a few days during which some 2,000 pesos worth of gold was recovered by amalgamation alone.

It is now fairly well established that the ores of the district require a large outlay of capital before successful production can begin, and the splendid returns from the Colorado mill will undoubtedly make the securing of capital a far easier task in the future than it has been in the past.

THE PARACALE DISTRICT,

[By F. T. EDDINGFIELD.]

Gold dredging seems to have fulfilled the prediction made last year by Fanning. The gold produced by dredging in 1911 shows an increase of about 50 per cent. over 1910 and an increase of 16 per cent. over the entire production of the district in 1910.

Gold production.

[Values in Philippine currency.]

Years.	Dredging.	Quartz mining.
	Pesos.	*Pesos.*
1910	128,505	43,395
1911	198,000	....

During the year 1911 the Stanley dredge, the Tumbaga Mine, and the San Mauricio Mine were not operating, so the entire production has come from the Paracale dredge and the one on the Maliguit River operated by the Heize Dredging Syndicate.

The Paracale Bucket Dredging Proprietary, Limited, backed by Australian capital, has been organized to take over the property of the Paracale Gold Dredging Company. They have continued operating the old dredge and have started building a much larger one, which is to be of the close-connected type with buckets of 5 cubic feet capacity. It will be operated without a screen in accordance with the latest Australian practice. The buckets dump into a box into which a strong jet of water is played to break up the cemented sand and clay. From the box all the material flows over the tables. It is claimed that the clay and cemented sand is further broken up by the bumping and grinding action as the material passes over the riffles. Several dredges in Australia, which were unable to pay dividends while using screens, proved very profitable when the screens were removed and the entire material allowed to flow over the tables. With this modification it is said that the dredges handle more material and save more gold.

The pontoon for the new Paracale dredge is being built of native hardwood cut and sawed on the property, the two classes of wood used being *malapajo* and *palansalan*. The latter wood is said to be remarkably good for underwater service. Rough calculation shows that this wood can be obtained for about 35 pesos per 1,000 board feet

The dredge at present working at Paracale digs up each day several tons of quartz fragments, many of which contain visible gold. These are sent to a mill built on the south side of the river. At the mill the ore is crushed partly by hand, then run through a small jaw-crusher, and elevated by a bucket conveyor to the ore bin. From the bin the ore is fed into a 5-foot Huntington mill and thence passes over amalgamation plates. The tails are concentrated on a shaking table and the concentrates are shipped to Australia. The quartz is so hard that difficulty is encountered in crushing with this machinery. A larger crusher followed by stamps would prove a good installation.

A dredge is also being built by the Philippine Exploration Company at the Gumaus property. This is a 5.5-cubic-foot Empire steam-driven dredge with wood hull and framing designed by the New York Engineering Company. It is of the close-connected bucket type with screens and stacking ladder and will be held against the working face by "spuds," one steel and one wood. The pontoon is made principally of pine. It will be interesting to compare the durability as well as the efficiency of this dredge with the new dredge of the Paracale Bucket Dredging Company.

The Gumaus property is not very heavily wooded, and it is not improbable that wood for fuel will be somewhat expensive. The ground is said to average 1.04 pesos per cubic meter and vary in depth from 8 to 20 meters. The gold in this deposit differs from the Paracale gold in being generally in rounded grains showing practically no crystallization. It is light yellow, and seems to be singularly free from iron stain. There is also more uniformity in the size of the grains and a smaller percentage of fine gold.

Since the closing down of the San Mauricio and Tumbaga Mines, the majority of prospectors have left Paracale for other fields. However, Mr. La Duc has been working steadily on the Navotas group and has sunk several shafts on small stringers. The main shaft is of 2 compartments, well timbered; a bucket running on guides is used for hoisting. A good head-frame has been erected over the shaft and a Mundy hoist has been installed. It was reported that the stringers though small are very rich in gold. The property is situated almost directly west of Paracale and can be reached from there in about one and one-half hours.

Southwest of Paracale, on Mount Togas, are a large number of veins striking northeast and southwest. They show evidence of having been extensively worked in the past by natives. Two years ago Mr. Samoza worked an *arrastra* at this place for a short time. Mr. Lafferty is now prospecting these veins and has uncovered some good-looking deposits. Rumor tells of an exceedingly rich vein in this section which the old natives called the *Insic* (the Tagalog word for Chinaman) lead, because the gold in the ore is shaped almost like the Chinese eye. It is not impossible that this vein exists, as well as other rich ones, for the district of Paracale has never been properly prospected. Prospectors have been generally content with opening up the old native workings and doing little new work.

The Heize Syndicate is still operating successfully with a dredge on the Malaguit River, and steps are being taken by the Stanley Company to put their dredge in working order.

THE BAGUIO MINERAL DISTRICT IN 1911

BY WALLACE E. PRATT

The Baguio Mineral District, located near the City of Baguio in the Subprovince of Benguet, has been discussed each year in the Mineral Resources of the Philippine Islands and has been the subject of several articles in the Philippine *Journal of Science*. All the available data on the geology and ore deposits may be found in the articles cited in the footnote. The gold ore of this district is classed as generally low grade (10 to 20 pesos per ton) with irregular and local high values. The prevailing rock has been shown to be andesite. The veins are usually true fissure veins, with subordinate contact deposits between andesite and diorite and between andesite and sedimentaries. Quartz, calcite and manganese characterize the vein material.

In October, 1911, the Baguio district suffered the severest typhoon in its history. New mills were severely damaged, and in some cases destroyed, on properties which had already suffered the loss of mills and other property through earlier typhoons. Mine roads were obliterated by land slides, and high water cut off all communication with Manila. While this damage was a severe blow to the district and curtailed the annual production, yet the confidence of the operating companies in the ultimate value of their properties is unshaken, and the recovery of the industry is already becoming evident.

That typhoons and the resulting floods are factors which must be taken into account in mining practice in the Philippines has already been pointed out. The typhoon factor in the Baguio district is recognized by the experienced operators as extremely important and it will be given greater consideration as the district develops. Already there is a tendency to avoid the lowest terraces along the Antamok River in locating new mill sites. The older mills were built on these lower terraces, on account of the favorable steep slopes obtained, but it is probable that future mills will be located higher above the river bed, even at the expense of less favorable slopes and longer pipe lines for water power.

The gold production for the Baguio district in 1911 amounted to 66,406 pesos as compared with 95,960 pesos in 1910, 243,500 pesos in 1909, 270,600 pesos in 1908, and 155.520 pesos in 1907. The Headwaters, the Benguet Consolidated, the Major Mines, and the Camote-Clayton have contributed to the year's production.

The Camote-Clayton on the lower Antamok River is equipped with a 3-stamp battery and plates for amalgamation. Mr. Reavis, who is in charge of the property, has recently made an attempt at cyanidation; the tailings from the plates are sent to an improvised classifier and the sands from this to leaching tanks, whence the solution is decanted to zinc-boxes for precipitation. Power for the mill is supplied by an overshot waterwheel made on the property, water being brought down in an open flume from about 200 meters up the river. The ore comes to the mill by gravity by means of a small aerial tramway. Underground, Mr. Reavis has continued development to supply the ore milled. The vein being worked, is a calcite-manganese vein, 8 to 15 meters wide in a contact zone between andesite and diorite. There is a tendency toward banded structure of calcite and manganese. The milling ore is largely calcite, much blackened by manganese oxides, with occasional patches of lighter colored quartz, apparently less contaminated with manganese. Recent development encountered ore carrying visible gold at a point 14 meters below the lowest former workings. In the specimens exhibited, considerable free gold and some malachite can be seen in an otherwise typical ore.

On the Major group of claims, located on a tributary of Gold Creek (Gold Creek and Antamok River are roughly parallel, separated by a high, narrow ridge, and together drain the area adjacent to the principal mines of the district), a 6-stamp Hendy mill operated during the early months of 1911. An unusually large number of veins have been found on the property, characterized, according to Smith and Eddingfield, by pyrite sometimes accompanied by galena and copper sulphides, in a quartz gangue. Ore with visible free gold has been noted in some of the veins. The veins occur in andesite and sedimentaries, possibly a result of contact phenomena.

The Benguet Consolidated is located on the Antamok River and is the oldest property in the district. It was damaged beyond operation by the flood in October, 1911, which destroyed the pipe line for water power. The cyanide mill had been destroyed by the flood of October 1909, and in the interim the stamp mill had been run under difficulties, the tailings from the amalgamating plates going to waste. The Consolidated has developed a large tonnage of ore and is considered to have a valuable asset in its possible ore reserves.

The Headwaters Mine, located on the upper part of the Antamok River, was operated only a few months after the completion of a new cyanide mill in 1911 when it was forced to close down by the flood in October. The following notes concerning the first operation of the Headwaters mill were obtained by Mr. P. R. Fanning of the division of mines, through the courtesy of Mr. F. L. Cole, who was in charge of the mill at that time.

The ore was trammed by hand from the mine to the mill, where it was passed over grizzly bars and through a Blake jaw crusher to the mill ore-bin. From the bin the ore was fed to a Hendy 10-stamp mill by Challenge feeders. The stamp-mill product was classified by an 8-foot Callow conical classifier from which the slimes went to a slimes collector and the sands to a Hardinge conical tube-mill, followed by a double cone classifier from which the slimes went to the collector and the sands were returned to the tube-mill by a Frenier sand-pump. The slimes from the collector were agitated from eight to sixteen hours in 2 Pachuca tanks, and then passed through 2 conical collecting tanks to a Ridgway filter. The solution from the filter went through a gold-solution tank to zinc-boxes from which it went to the sump for return to the head of the mill. The precipitated values were cleaned by acid and smelted to bullion in a gasoline pot-furnace. Owing to difficulty in the operation of the Ridgway filter, it was cut out of the process and the gold solution was decanted directly from the conical collecting tanks to the gold-solution tank. The collecting tanks used as decanters were fitted with filter bottoms, consisting of boards perforated with 1-inch holes, covered with burlap, coco-matting, and light drill sheeting.

In usual practice the ore was crushed in cyanide solution averaging 0.05 per cent. potassium cyanide. Cyanide was added in the collector to bring the strength of solution up to 0.15 per cent. potassium cyanide. To neutralize the varying acidity of the quartz-calcite-ore from 5 to 20 pounds of lime per ton of ore were required. The capacity of the mill was from 60 to 70 tons per twenty-four hours with the stamps dropping at the rate of 100 per minute. Running at this capacity on average ore with the stamps crushing through 12-mesh and the tube-mill reducing the pulp until 95 per cent. of it passed 100-mesh, the treatment recovered 90 per cent. of the gold values. Power is supplied by a 6-foot Pelton wheel with a 100-foot head of water, supplemented by 2 gasoline engines of 15 and 25 horsepower respectively. Water for power is obtained by means of a diversion weir across the river about 500 meters above the mill and an 18-inch steel pipe line with a pressure box at the mill-site.

In March, 1912, the Headwaters Mine resumed operation under the management of Mr. Phillipson, of Baguio, with Mr. W. D. Power supervising the mill and the mine. Through the courtesy of these gentlemen the following data were obtained concerning the first cleanup.

Tons of ore treated	400
Hours of mill operation	178
Per cent. of extraction (approximately)	90
Value of cleanup:	Pesos.
Gold	6,551.58
Silver	87.52
Total	6,639.10

Mr. Power made no attempt to use the Ridgway filter because of its extreme complication. Satisfactory results were obtained by decantation since the slimes settle rapidly. The ore for this run was considered to be representative of the average Headwaters ore in gold value. The mill is handicapped by insufficient power on account of the low stage of the river. It is planned to replace the gasoline engines by one of 50 horsepower. The present management is storing a quantity of supplies sufficient to permit the operation of the mine throughout the approaching wet season, in anticipation of the interruption of communication with Manila by floods.

The Bua Mine in the Antamok Valley, and the Muyot Mine and the Kelley Mine both in the Gold Creek Valley, are all properties on which extensive development work has been done. On the Bua, a Hendy 6-stamp mill has stood idle since October, 1909, when floods destroyed the flume which carried water for power and damaged the mill considerably.

Neither the Muyot nor the Kelley properties have installed mills. The Kelley Mine has opened up 5 separate veins which are partially developed by drifts and crosscuts. The ore is a pyrite-bearing quartz, and gold as a telluride has been reported. The veins are not all parallel and the resulting intersections and branchings suggest an irregular vein system or fracture zone.

On a number of other claims in the district, the annual assessment work has been done as usual. From the Bonanza group, east of the Headwaters Mine, ore containing visible free gold was encountered in recent development work.

CANSURAN MINING DISTRICT

[BY F. T. EDDINGFIELD]

LOCATION

The Cansuran Mining district is located about 10 kilometers south of Surigao, Mindanao, near the center of the Peninsula of Surigao. The district extends from a little beyond *Mounts Canmajat and Binutong north-easterly* to the Surigao River, comprising principally the area between the Biga and the Tungunaan Rivers which flow into the Surigao.

HISTORY AND DEVELOPMENT

It is said that over thirty years ago an Englishman operated in the district for a short time. About the year 1885 a Spaniard, Ricardo Gonzales, obtained a concession by which he controlled all the water rights of the district. He did no mining himself, but granted water rights to the natives for 25 per cent. of the gold produced, with the privilege of buying at a very low figure all of the gold which they obtained. Since that time the natives have worked whenever sufficient water could be obtained for sluicing.

While the methods employed by the natives were very crude, they were able to recover a large percentage of the gold from the gravels. They carried water, sometimes several hundred meters by means of flumes made from the bark of trees, the most durable flumes being made of *palma brava.* Even a very small stream of water enabled them to do very extensive work. The water was led to the top of the face of the gravel to be worked and allowed to flow down it. The gravel was loosened by bars or shovels and was washed down through a narrow trench, which in places had to be cut through the bed rock. The light material was allowed to wash away, but the gravel, which accumulated in the trench, was raked and picked by hand and finally thrown up on one bank with coconut shells. The boulders were piled on one side of the trench, forming a wall which retained the waste. Boulders too large to be moved by hand were drawn out or to one side by means of a rattan rope which wound upon a post set vertically, guyed firmly with rattan, and fitted with one or two horizontal arms. Boulders too large to be moved in this manner were left in place and worked around. At regular intervals the concentrates in the bottom of the trench were panned to recover the gold.

In places where water could not be obtained, tunnels were driven along the bed rock and the rich gravels were carried down to water and panned. Some of these workings are very extensive, undermining large areas.

The cuts made by the natives give an excellent idea of the extent of the workable ground and of its value. The average miner can earn over a peso a day, when only two or three work together. When a large number work together, even better earning is reported.

CHARACTER OF THE DEPOSIT

The gold occurs as placer and is unusually coarse for the Philippine Islands; many nuggets have been found weighing over 30 grams each. The great majority of the gold as brought in by the native workmen would not pass a 30-mesh screen and a large amount would be caught on a 10-mesh screen. The grains are for the most part well rounded showing considerable movement, except on Tagbasingan and Canmajat Mountains where crystallized gold, often wire gold, is found which apparently has not been moved far. The workings on Canmajat are said to be in quartz and the gold to be panned from crushed rock taken from a vein which cuts across Canmajat, striking almost north and south. The average gold in the district runs about 700 fine in gold and 200 in silver.

The gold in the southwestern part of the property, that portion which is made up of high hills and ridges, is found in gravel beds from 3 to 10 meters thick. These beds cover the hills and ridges almost uniformly and have the appearance of being deposited by one or more old rivers. They are made up of coarse and fine gravels. Boulders weighing several tons are common, and boulders weighing from 10 to 100 kilograms each are very abundant. Most of these, probably 90 per cent.; are andesite, others are schist, diorite, and red felsite. In the northwestern part along the Cansuran River some quartz pebbles were found, but the greatest part of the deposit contained no quartz pebbles of any size.

These gravel beds must have been the deposits from old rivers which washed the gold of the quartz veins and stringers from the formation which at that time covered the present surface. This old formation with its gold bearing veins and stringers has been mostly eroded and the present hills once formed the valleys in which the alluvium was deposited. The unusual distribution of the alluvium, covering the hill sides as well as their crests and also covering the depressions between hills, would tend to indicate that an uplift had taken place irregularly throughout the district and that the old river beds had been raised above their former positions. The character of the bed rock affords no conclusive evidence supporting this theory, although the northeastern part has undergone great compression stresses producing schists and much-folded shales. This was done previous to the deposition of the alluvium and consequently did not affect it.

The highest peaks in the district, Canmajat and Tagbasingan, are said to contain quartz veins rich in gold.

The uplift of the district must have been more or less general over the entire peninsula, raising at the same time the limestones of the northwestern and eastern coasts. During the period following the uplift the erosion must have been very gradual as shown by the fact that a large part of the alluvium is in place. The heavy forests, which now cover the district must have sprung up during this period and subsequently served to hold the loose gravel in place. About a meter or more of soil covers the gravels proper. This soil was produced by the decomposition of the gravels as attested by the fact that it carries gold even within a few centimeters of the surface. The gravels below are somewhat weathered and partially cemented in places and contain gold values throughout, although the richest portions are found in certain beds and streaks which generally, although not universally, lie next to the bed rock.

Value of the Deposit

The present owners of the property have built a flume which carries water from a branch of Cansuran Creek to a reservoir situated about 50 to 60 meters above their present workings. From this reservoir water was obtained for operating a sluice and it is reported that the ground worked at this point averaged about 5 pesos per cubic meter. This was said to be an exceptionally rich area. On any piece of ground where water can be obtained the natives are able to make over a peso per day. Goodman, in his report, stated that the average value of the ground worked in çertain parts of this property was 2.08 pesos per cubic meter. He obtained this figure by measuring four days' work of a native miner with 3 assistants. This amounted to a recovery of 15.60 pesos worth of gold from 7.5 cubic meters of gravel. He stated further that this represented an average run for native miners in the district. Several test holes have been sunk by the present company over a considerable area from which pannings were taken and values per cubic meter estimated.

The water supply used at present by the Surigao Gold Mining Company is too small to furnish power for hydraulic operations. A survey has recently been made locating a ditch from the Tugunaan River. It was found that this ditch could be built with little difficulty from the Tugunaan to their present reservoir, a distance of 1,700 meters, furnishing abundant water for several hydraulic machines. This would insure the working of all the gravels below an elevation of 120 meters, assuming the junction of the Biga with the Cansuran as zero elevation. There remains a large amount of ground above this elevation which could only be worked by means of a high pressure pump; this area is approximately equal to 3 full-sized claims, while the workable ground below the 120-meter mark amounts to about 6 full-sized claims.

If on account of probable unworkable and barren areas we assume 50 centavos as an average value of the ground, ignoring the values of 2.08 and 5 pesos calculated by other investigators and the value of 1 peso which was obtained in this investigation by estimating the value of numerous panning tests taken from working places throughout the deposit, the amount of gold recoverable by gravity water-power would be about 7,000,000 pesos (3,500,000 dollars U. S. currency) and an additional amount recoverable by high pressure pump 2,600,000 pesos (1,300,000 dollars U. S. currency).

The ground held by the Surigao Gold Mining Company consists of 22 full-sized claims and 8 half-sized claims, an area equal to 1,664 hectares (about 4,160 acres). A large part of the ground in this area not mentioned above as sluicing ground would probably prove to be good dredging ground, especially that portion lying in the Tugunaan Valley. This area contains about 600 hectares (1,480 acres.) A few test holes have been sunk in this ground with a 3.5-inch drill, but no reliable results were obtained. One or two holes were sunk about 20 meters before bed rock was encountered.

Conclusions

This property presents as great possibilities as any mining property in the Philippine Islands. That it has remained so long undeveloped is remarkable, but this is probably due partly to its distance from Manila, the unsettled condition of Mindanao, and the erroneous belief that it had been thoroughly worked over in the past.

MISCELLANEOUS MINERAL DISTRICTS

[By F. T Eddingfield]

During the last year the center of mining activity has shifted from the north to the south. Very little has been reported from Mancayan, Suyoc, Ilocos Norte, Benguet, or Pangasinan. The only northern district attracting much attention has been northern Tayabas at Dingalan Bay, where rich deposits of placer gold were found. A dredge is now being built to work part of this ground.

The chief southern districts are Aroroy, Paracale, Marinduque, Milagros, Mindoro, and Mindanao. The first two are discussed elsewhere.

In Marinduque the stamp mill, erected 19 kilometers south of Santa Cruz, is standing idle because the ore at that point proved too irregular to be profitably worked. A large deposit of leadzinc ore which may prove economical is reported about 10 kilometers from this point. It is said that transportation will probably be the only serious problem to be overcome.

At Milagros, Masbate, are copper deposits which have been prospected for several years under the direction of Mr. Brobst. A company has been formed called the Oklahoma Mining Company which did some development during the past year. Mr. Brobst reported that a 100-meter tunnel cut a vein 13 meters wide at a distance of 40 meters from the mouth, but the tunnel was continued to reach another vein supposed to be 80 meters farther. The vein cut contained lead and zinc.

A shipment of 10 tons of copper ore was sent to the United States from which the following returns were reported:

	Pesos.
Gold	200.00
Silver	85.00
Copper	600.00
Lead	20.00
Total in 10 tons of ore	905.00

Mindoro is known to contain paying deposits of placer gold and several veins of copper. The presence of oil and gas has also been noted, but conditions have been unfavorable to their development.

Mindanao is attracting a great deal of attention. Placer deposits are found at Cansuran and Placer in Surigao, at several points in Misamis, and at numerous places in Butuan on branches of the Agusan River.

FORMOSAN PUBLIC WORKS

Among the public undertakings directed by the Department of Public Works in the last fiscal year were the following, with the amounts expended on each: Korisho irrigation works, $141,126; Takao waterworks, $334,102; Keelung harbor works, $488,321; Takao harbour works, $510,536; Tainan local court, $77,981; and repairs to the Governor-general's residence, $63,980. For the years 1912 and 1913 the Government undertakings are:

Taihoku city improvements	$80,285
Bridges and roads	98,000
Tamsui harbour dredging	25,000
Investigation of artesian wells	9,950
Investigation of rivers	50,000
Keelung harbour works	344,750
Takao waterworks	267,500
Kagi waterworks	80,000
Tainan waterworks	100,000
Central laboratory	61,000
Government building (contract to American firm)	350,493
Governor-general's residence, repairs.	35,000
Tainan local court	35,000
Technical school	25,000
Agricultural station	31,650
Taihoku hospital	200,000
Medical school	61,450
Language school	30,578
Middle school	13,275
Girl's higher school	20,267
Takao post office	36,275
Monopoly bureau	105,852
Sugar-inspection, office, Takao	57,122
Sericultural station	36,500
Taihoku prefectural office	60,000
Taichu prefectural office	40,000
Tainan prefectural office	50,000
Total	2,304,947

Railway construction:	
Branch line—Kyukyokudo to Ako	475,000
Branch line—Horin to Basshisho	378,500
Double track (section only)	70,000
Total	923,500

The total appropriation for educational purposes in the island amounted to $1,060,000 in 1910. The schools include the middle school, for Japanese boys only; girls' higher school, also Japanese; language and normal school for Chinese and Japanese; and medical school for Chinese only. An appropriation of $29,850 for a technical training school for Chinese was passed last year and the building is now being erected in Taihoku. On the whole, the system of education is impartially administered.

The improvement of the health and sanitation of the island is worthy of special note. Malaria as an endemic disease has virtually disappeared except on the east coast, and bubonic plague is recurrent in only one locality. In the capital city of Taihoku a large sewer, built of reenforced concrete, has lately been completed and other sanitary improvements have been carried forward.

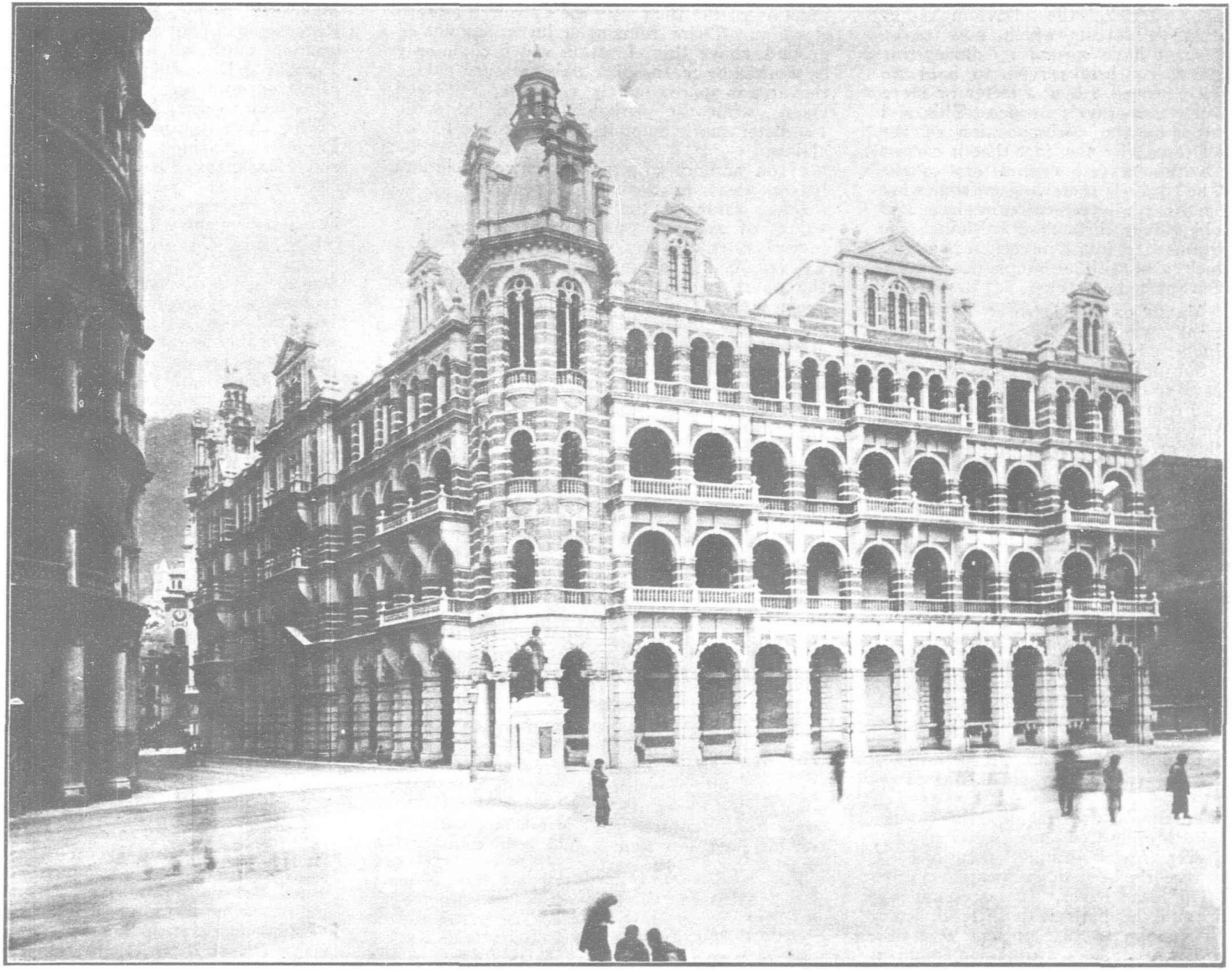
The railway earnings in 1911, amounting to $2,500,000, furnish an index to the general prosperity of the island. The total mileage is 295. A short distance of the main line will be double-tracked next year.

HONGKONG'S NEW POST OFFICE

The recently completed Hongkong Post Office adds considerably to the substantial appearance of the water front of Great Britain's Far Eastern Colony, despite the fact that it does not possess the clock tower, which many residents in their wisdom thought should grace its north-eastern corner. The design is by the Hongkong firm of architects Messrs. Denison, Ram and Gibbs, and was selected as the best of three submitted in competition. The site upon which the building has been erected was purchased by the Government for $508,280 (Mexican currency) and contains 25,414 square feet between Connaught and Des Voeux Roads, at their intersection with Pedder Street.

The basement and ground floor of the building extend over practically the first floor, a large, central courtyard, measuring about 60′ × 50′, is introduced, round the four sides of which the remainder of the building is disposed. The various offices are arranged on the three sides abutting on the above-mentioned roads, whilst on the fourth, which abuts on a private lane, jointly owned by the Government and the P. & O. S. N. Co., are arranged the lavatories and coolie quarters. The courtyard over the central portion of the ground floor, which consists of a concrete flat, is utilized as an emigration yard, certain portions being provided with a glazed roof supported on brackets projecting from the walls to form a shelter.

The verandah pillars and arches on the ground floor are constructed entirely of granite, which is also extensively used in the pillars and arches of the remaining floors and in the main walls of the building on all three principal fronts. Otherwise the walls are of Canton red brick, faced externally with Amoy bricks. Many of the floors are constructed of cement concrete covered with tiles or granolithic, the others being of teak boarding on hardwood joists. All corridor walls are tiled to a height of 3′ 6″, all lavatory walls to a height of 5′ 0″, : the walls of the Chinese Letter Department, which is situated in the



THE NEW POST OFFICE AT HONGKONG

basement, to a height of 4' 0" and the remaining internal walls are plastered and distempered. The whole of the doors, windows and finishings are of teak, stained and dull polished.

For heating the Postal and Treasury Halls, a system of low-pressure hot water heating through radiators is provided. Arrangements are being made to extend this to some other portions of the building which are unprovided with open grates.

The roofs generally are covered with Canton tiles on hardwood rafters supported on iron purlins, but at the gables special tiles and rolls of cement concrete reinforced with small iron rods are used.

The flat roofs to verandahs and over the central portion of the ground floor are formed with cement concrete, covered with "A Grade Pabco" and finished with granolithic.

The building is lit with electric light and fitted with electric fans throughout and is also provided with two electric passenger lifts and one electric goods lift for conveying mails from the basement to the ground floor. Exhaust fans are placed in the Chinese Letter Department for the extraction of foul air.

The main staircase, which is situated at the south-east angle of the building, is of teak. Subsidiary staircases, constructed of granite, are provided in the north-west and south-west angles of the building. A staircase for office attendants is also provided from the first to the third floor. An iron fire escape connecting with all floors is fixed on the West Front adjoining the private lane previously mentioned.

The arrangement of the various Government Departments on the different floors is as follows:—

Basement: occupied principally by the Postal Department, contains the Chinese Letter Department, a tiffin room and a number of store rooms, one of which is used by the Sanitary Department. The boiler for the heating apparatus is also located in the basement.

Ground Floor: entirely occupied by the Postal Department, contains the Postal Hall, 93' × 45', Sorting Hall, 93' × 65', Registration Room, 57' × 29', Box-holders Room, Postmaster-General's and Assistant Postmaster-General's Offices. As already mentioned, an electric lift for raising letters to the main sorting hall connects this floor with the basement.

First Floor: occupied by the Treasury and the Registrar-General's Departments, contains the Treasury Hall, 76' × 36', the Stamp Office, 43' 6" × 14' 3", Stamp Vault, 40' × 18', 12 other offices, ranging from 34' × 30' to 13' 6" × 10', and 2 strong rooms. 3 small rooms on the western side of the building, adjoining the private lane, are used in connection with the inspection of emigrants.

Second Floor: occupied by the Sanitary Department, the Local Audit Office, Education Office, Southern District Office and a telephone exchange, contains in all 21 rooms used as Offices, ranging in size from 50' × 21' to 13' 6" × 10'.

Third Floor: provided for the future expansion of the Departments housed in the building, contains 20 rooms ranging in size from 36' × 30' to 13' 6" × 10'.

In addition to the above, there are 16 small rooms for office attendants on the western side of the building, adjoining the private lane, a mezzanine floor being here interposed between the first and third floors of the main building.

Lavatories are provided on all floors except the basement.

The steel structural work throughout the building has been encased in fine cement concrete with a view to protecting it in case of an outbreak of fire.

It is interesting to note that when the competitive designs were invited the specifications were for a three-storied building to cost the modest sum of $500,000 exclusive of architects fees; but the total expenditure down to December 31, 1911, actually mounted to $1,035,485.50. This increase was largely brought about by the inclusion of a fourth storey, and other alterations in the original specifications.

It was also intended to have clock tower erected, but that was later abandoned. It was when the foundations were nearing completion, that Sir Matthew Nathan, who was then Governor, proposed that a Clock Tower should be added. This proposal was adopted and the necessary alterations in the foundations were carried out, contributing towards the delay in their completion.

Besides giving rise to extra work in the foundations, the proposed addition of a Clock Tower necessitated the substitution of granite for brickwork in the construction of those walls upon which the tower would be carried, thus causing additional expense Owing to the increased cost of the building resulting from the addition of a fourth storey, the alterations entailed by the proposal to construct a Clock Tower, the general and large advance in cost of work which occurred about the time the Contracts were let and other causes, it was ultimately decided, in January, 1910, that the tower should not be proceeded with in the meanwhile and the structure has been terminated and covered over immediately above the ridge of the roof of the main building.

The building was occupied by the middle of of 1911, though the installation of the heating apparatus and various minor alterations had to be carried out subsequently.

CHINA'S FINANCES

Complete Schedule of Obligations

In view of the uncertainty that prevails in many quarters in regard to the actual extent of China's financial obligations at the present time the schedule we give below, which is authentic, will be read with interest:—

DETAILED LIST OF PAYMENTS TO BE MADE BY CHINA UP TO JUNE 1913

First Period

Payments to be made up to the 31st December 1912

(*a*) Indemnity and Old Loans

Indemnity from October 1911 to September 1912	H. K. Tls.	24,885,125	
Indemnity from October 1912 to December 1912	„ „	4,974,825	
Loan from Hongkong Bank	Shanghai Tls.	1,166,300	
do.	£ stg.	14,375	
do.	„ „	218,000	
Tientsin-Pukow	„ „	208,808	
do.	„ „	241,738	
Loan from Arnhold Kerberg....	„ „	9,000	
do.	„ „	13,500	$44,740,735.70

(*b*) Temporary Short Loans

Short period patriotic internal loan	Chingping Tls.	269,900	
do.	Kuping „	30,000	
Money owed to Bank of Communications	Chingping „	100,000	
do.	„ „	80,000	
do.	$	200,000	
Bank of China	$	70,000	
Commercial Protection Bank....	$	400,000	
do.	Kungfa Tls.	10,000	
Firm Kang Mao	„ „	520,000	
Cantonese Guild................	$	1,344	
do.	Shanghai Tls.	421,500	
Kiangsu Bank..................	$	20,000,000	
Lin Chu Tsao	Shanghai Tls.	150,000	
Chinese abroad	„ „	279,606.31	
do.	$	211,686,465	
Singlung Co. at Yunan through Wei Wu Pu	K'ping Tls.	506,250	
Merchant Bank by Board of War.	Chingping „	154,622	
do.	$	66,300	
Posthumous donations account ..	Tls.	126,564,138	
do.	$	360	
Salary account by Board of War.		9,771,36	
do.	Tls.	431,570,226	
by Board of Navy for cost of ships, etc.	$	989,995,50	
by Board of Navy to Native Banks	$	129,926,40	
by Board of Interior to Yufeng Native Bank	Tls.	43,000	
by Board of Interior to Government fund account..........	„	75,781,60	
by Board of Interior to Major Hengliyi Bank..............	„	34,055,57995	
Money owed to Deutsch-Asiatische Bank for Chinese Minister in Brussels	Frs.	60,000	
Deutsch-Asiatische Bank for school fee by Minister in Berlin	Mks.	250,000	
Diederichsen & Co.	„	5,000,000	
Carlowitz & Co. for guns	Tls.	1,568,155,46	
Bielfield & Sun for guns	„	151,700	
American Bank for students going to America	Kungfa „	30,000	
American Bank for Chinese Minister in Washington	G. $	156,000	
to Russo-Asiatic Bank by Board of Education	Tls.	70,000	
Belgian Bank for school fee. ..	£ stg.	20,000	
Belgian Bank	Frs.	129,782,90	
Banque de l'Indo-Chine for students fee................	„	275,000	
Banque de l'Indo-Chine	„	200,000	
Yokohama Specie Bank	Kungfa Tls.	251,485,46	
Yokohama Specie Bank for school fee..................	Yen.	270,000	
do.	„	10,396	
Yokohama Specie Bank by Board of Interior	Kungfa Tls.	87,000	
do.	$	2,000	
Japanese firm Ta Tsiang for war munitions	Y.	1,821,760	
do.	Tls.	575,320	
Mitsui Co. for war arms........	Chingping „	86,000	
do	Y.	79,500	
Yita & Co. for war arms........	Tls.	106,340	
Japanese merchants	„	67,000	$32,031,399,6388

(*c*) Loans Made by Nanking and Other Provinces

Money owed to Mukden Gov't Bank (interest not included)	Y.	2,446,831	
Kiangsu Merchants native loans for helping		400,000	
Shanghai market interest account.	$	110,000	
Canton native Banks about		516,000	
do. interest....		258,000	
Kuang Sui Co. Heilung Kiang ..	Tls.	3,960,000	
Hunan Gov't Bank	„	1,000,000	
Ta Ching Bank (interest excluded)	„	200,000	
Salt Merchants (deducted from Salt Tax)	„	960,000	
Ta Han Bank (interest excluded)	„	300,000	
Merchants at Kiangsi	$	556,460	
Bank of Republic	Tls.	1,170,260	
Shansi Merchants & Gentry	„	540,000	
do.	„	85,000	
do.	$	700	
Money owed to Shansi Merchants & Gentry copper cash.	Tiao.	4,280	
Bank of China by former S'hai Tutu	Tls.	100,000	
Hongkong Bank at Hupei about	„	77.125	
Hongkong Bank (Capital and interest)	„	1,326,025	
Four Nations Banks for interest account	„	140,000	
Carlowitz & Co. (Interest excluded)	„	560,000	
Carlowitz & Co. (deduct from Mines products, interest excluded) ..	„	1,000,000	
Carlowitz & Co. by Shanghai Arsenal about..............	„	94,000	
Mitsui Co.	Y.	300,000	
do.	Shanghai Tls.	700,000	
Mitsui Co. for Hanyang Iron Works (interest account) ..	Y.	70,000	
Mitsui Co. at Anhui	„	200,000	
Yokohama Specie Bank Canton..	Tls.	500,000	
Bank of Formosa at Canton	Y.	600,000	
do	„	400,000	$24,661,586,43

Second Period

Payments to be made from January to June 1913

(*a*) By the Central Government

Indemnity......................	H. K. Tls.	9,949,650	
Kelung Co.	£	6,000	
Debts contracted by Lanchow Mines	Tls.	303,463,3896	
do.	$	170,000	
Patriotic loan (interest account)	$	338,100	
War loan interest	$	400,000	
Advance for Lung Sung Co. Yunan	Kuping Tls.	250,000	
Advance on Currency Loan	£	424,000	
Six Groups preliminary advances	£	1,800,000	
Hongkong Bank................	£	28,125	
do.	£	12,000	
do.	Tls.	38,150	
British & German Loan	£	417,616	
Arnhold Karberg	£	72,666,13/4	
do.	£	9,000	
do.	£	13,500	
Belgian Loan	£	1,025,000	
British & Belgian Loan		256,250	
Franco-Russian Loan 1895......	Frs.	5,556,905	
Interest on Crisp Loan	£	100,000	$68,808,751,612

(*b*) By Nanking and the Provinces

Capital and interest to Mitsui ..	$	2,587,500	
do. Bank of Formosa at Canton	$	200,000	
Capital and interest Carlowitz at Chekiang	Mks.	1,268,273.97	
Advance to Wei Wu Pu for American student fee	Tls.	7,000	
Interest to Russo-Asiatic Bank ..	„	336	
Interest on loan from Hongkong Bank for Kiangsu	„	70,000	
Interest on loan from Hongkong Bank for Shanghai market..	„	120,000	
Four Nations Banks interest	„	70,000	$4.171,890,855

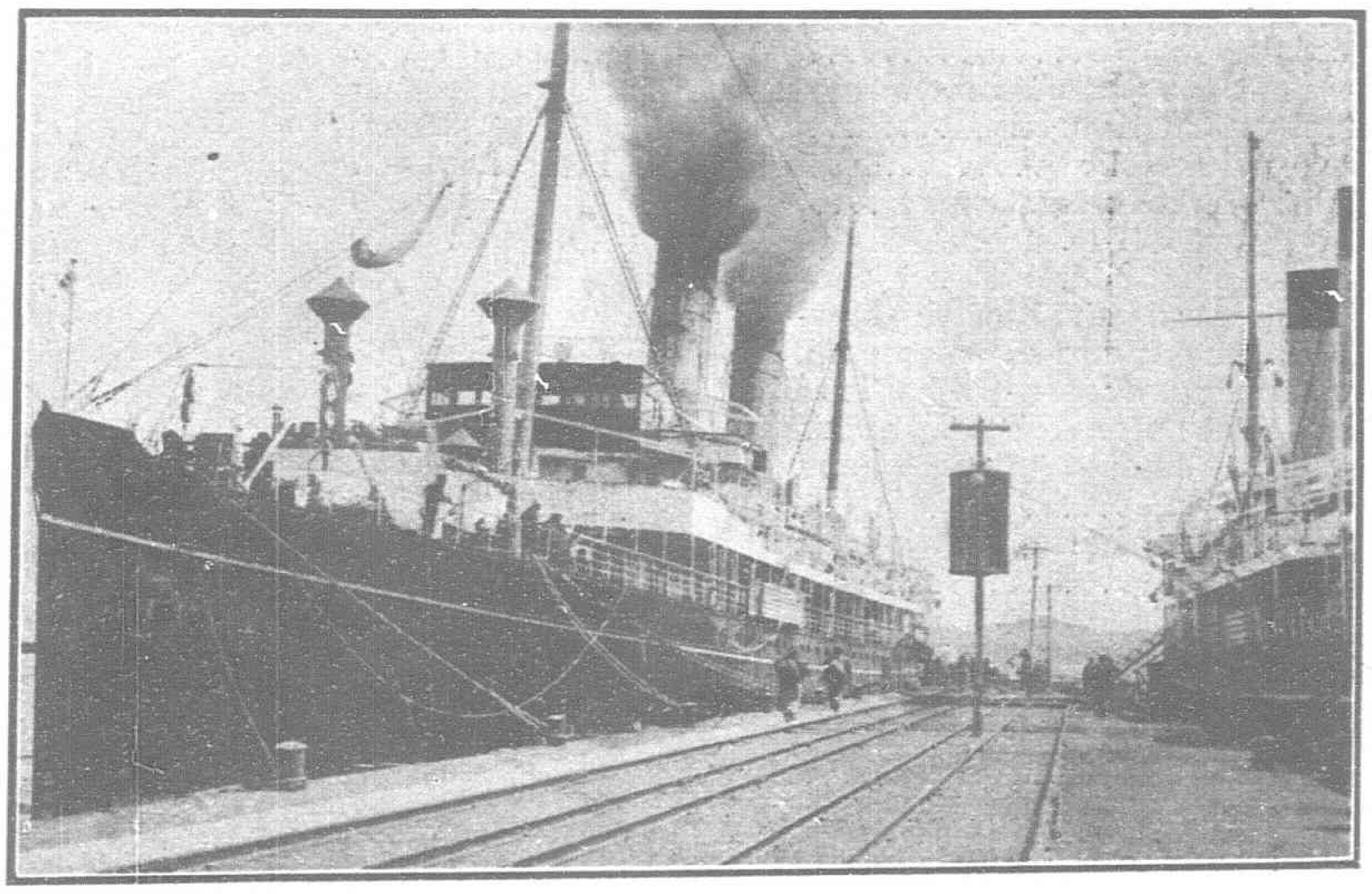
RECAPITULATION

China will have to disburse:

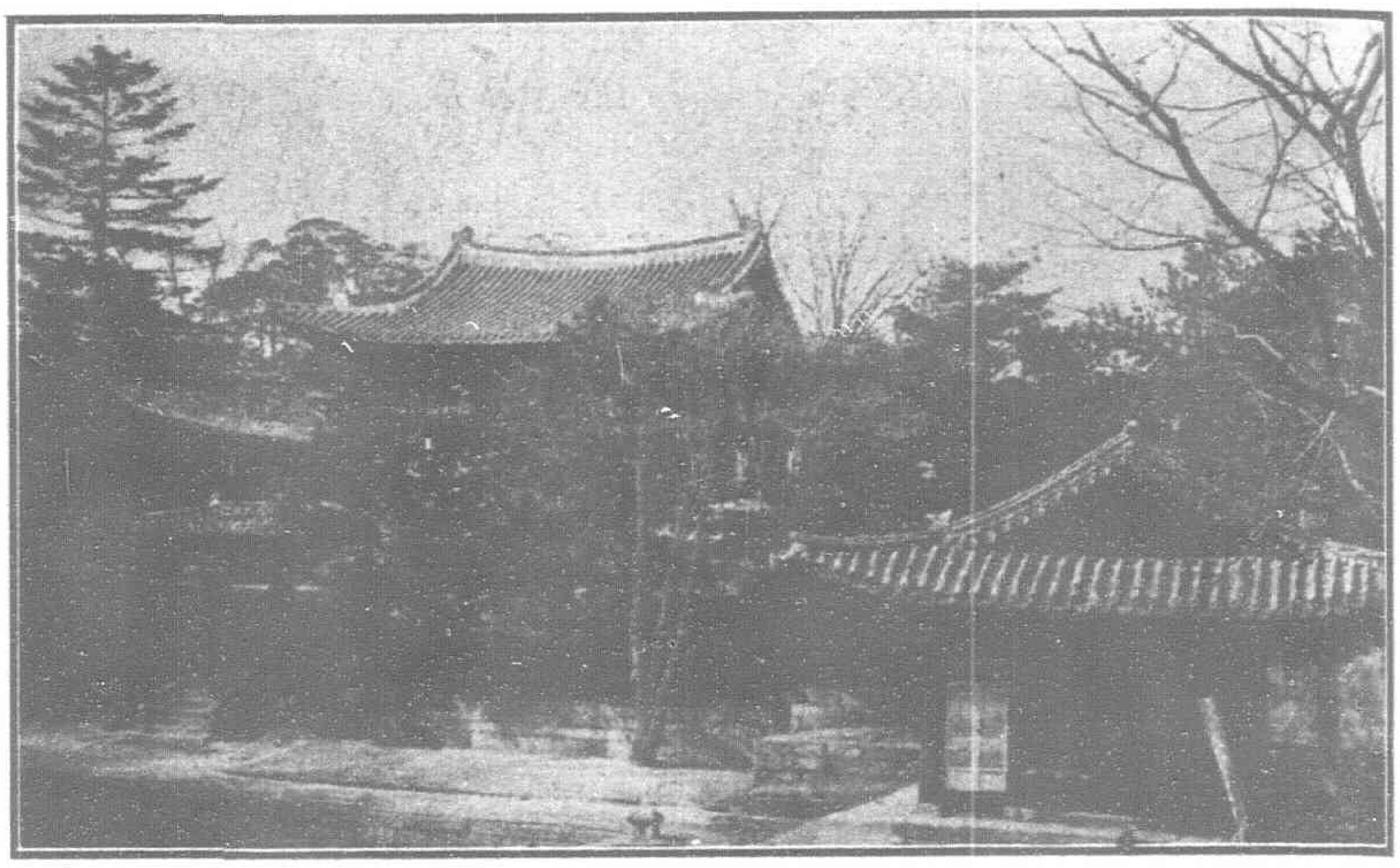
First Period up to 31st December 1912		
(Indemnity and old Loans)......	$ 44,740,735,70	
(Temporary short Loans)	32,031,399,6388	
(Loans made by Nanking and others Provinces)	24,661,586,43	$101,433,721,7688
Second Period from January to June 1913		
(Loans made by the Central Government)	68,808,751,612	
(Loans made by Nanking and other Provinces)	4,171,890,855	$72,980,642,467
Total		$174,414,364,2358

THE RAILWAYS OF CHOSEN (KOREA)

PICTURESQUE ROUTES AND WELL-APPOINTED TRAINS

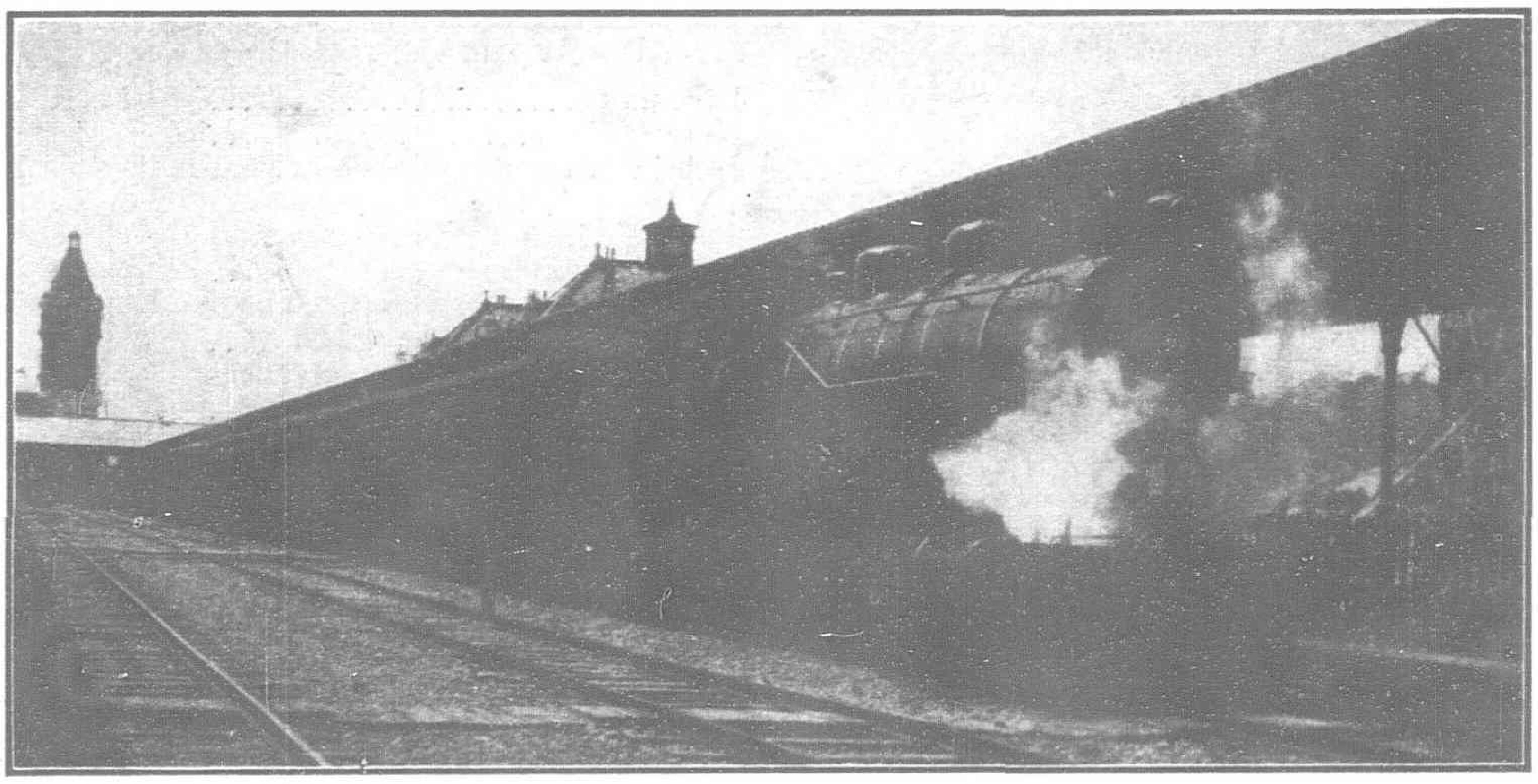


FERRY STEAMER ALONGSIDE THE PIER AT FUSAN



PAVILIONS IN THE SHOTOKU PALACE, SHOTOKU

Well directed efforts are being made by the administration of the Chosen (Korean) Railway to make the service as attractive for tourists as it is proving to be useful for commercial purposes. Korea is no longer a Hermit Nation. The enterprise of the Japanese is opening up the country as rapidly as funds will allow, and in addition to the main trunk line from Fusan to Antung, branch lines are being pushed out east and west, which are opening up districts full of interest to the traveller. We recently gave the latest statistical information available in regard to the commercial operation of the Korean railways and our present purpose is briefly to illustrate the facilities and attractions of the line to the tourist. It may be well to explain that the Japanese nomenclature is followed in this article and the reader is consequently asked to bear in mind that Keijo means Seoul, Jinsen means Chemulpo, Heijo means Pyongyang and Shingishu denotes Wiju.



THROUGH TRAIN LEAVING THE FUSAN STATION

GENERAL INFORMATION

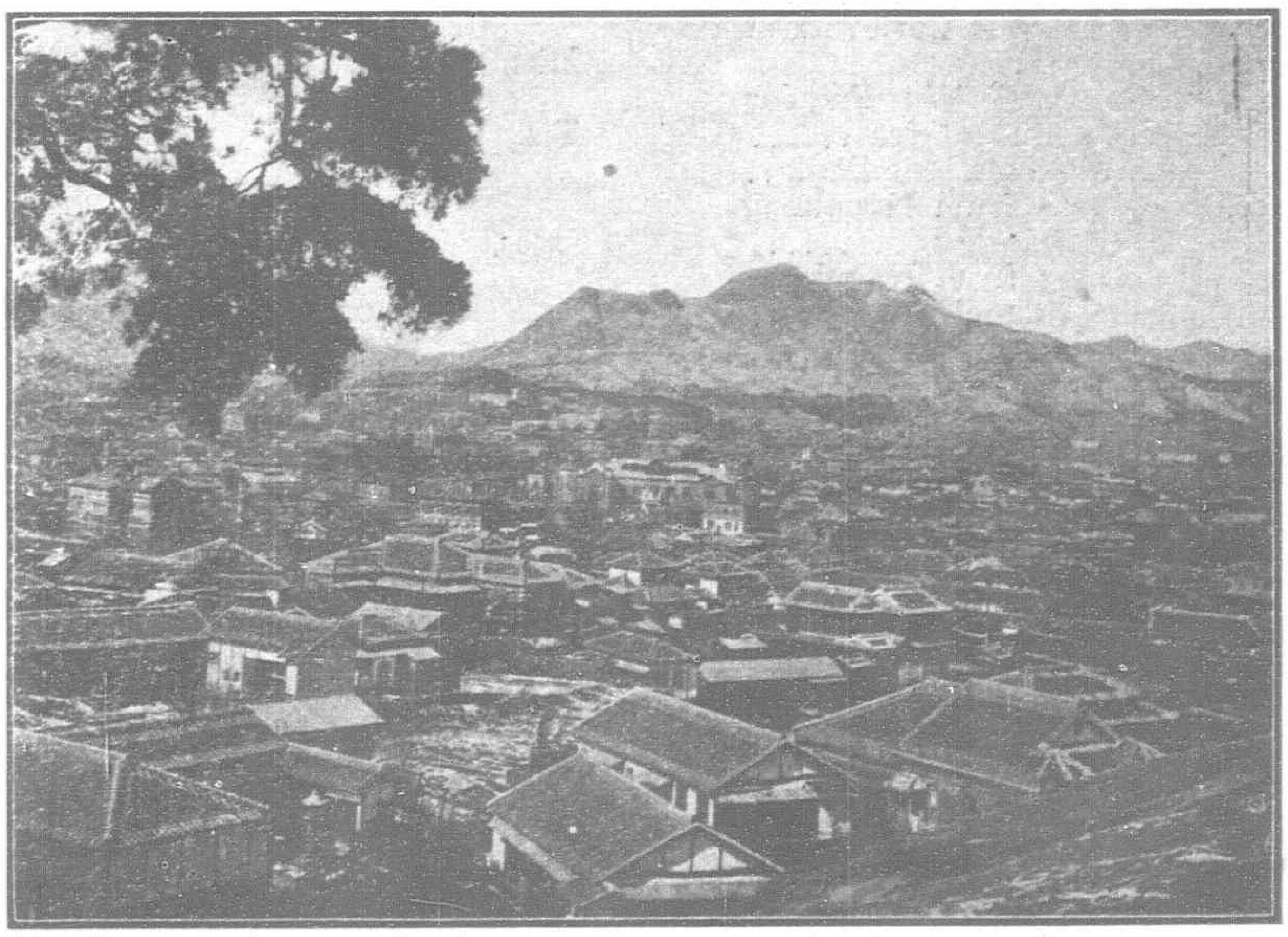
All the railways of the Government-General of Chōsen are of standard gauge and at present have a length of about 800 miles. The main line starts at Fusan, passes through Taikyū, Taiden, Ryūzan, Keijō (Seoul), Kaijō (Pyongyang), &c., and terminates at Antung beyond the River Yalu which forms a natural dividing line between Chōsen and China.

There are branch lines to Masan, Kunsan, Jinsen (Chemulpo), Rensen, Chinnampo, &c.

The main line open to traffic is divided into two sections. namely :—

The Keijō—Fusan Section; the Keijō—Antung Section.

In addition, the Konan line which leads from Taiden to Moppo on the south-west coast, and the Keijō-Gensan line which leads from Ryūzan to Gensan on the east coast, are in course of construction. Parts of these lines are now open to traffic and the work is being



BIRD'S-EYE VIEW OF KEIJYO (SEOUL)

COOLIES CARRYING CEREALS

AN ANCIENT IMAGE

rapidly pushed forward, so that in the near future the whole length of available lines will aggregate 1,000 miles.

The Keijō-Fusan and Keijō-Antung lines are joined at Ryūzan and form a trunk line throughout the peninsula, extending from Fusan in the south to Antung in the northwest. In the north, connection is made at Antung by the railway bridge newly completed across the River Yalu with the Mukden-Antung branch of the South Manchuria Railway, which joins the main line at Mukden, thence to Peking via the Imperial Railway of North China. The triweekly express trains between Fusan and Changchun which are run in connection with the trains for Europe via a branch line of the Chinese Eastern Railway, have lately been put into operation.

In the south, the ferry service between Fusan and Shimonoseki is maintained twice a day by the Imperial Japanese Government Railways' steamers fitted with every up-to-date accommodation for the comfort and safety of passengers.

Between Jinsen and Dairen (Dalny), transportation is effected by the Nippon Yūsen Kaisha's and Osaka Shōsen Kaisha's liners six times a month.

The Chōsen Railway, thus forming the shortest overland route between Japan, Chōsen and Europe, and one of the most important trunk lines of the round-the-world traffic, is expected to draw many passengers from Europe to Japan and vice versa.

POINTS FOR PASSENGERS

Express Trains

Fusan-Changchun.—Triweekly through express trains which take 1st class, sleeping-and dining-cars only, are run in both directions.

Passengers travelling between the Far East and the West should note that Express Extra Tickets may be purchased in addition to the ordinary fare tickets.

The charges are as follows:—

Under 200 miles,	Y2.00
Under 500 miles,	Y3.00
500 miles and over,	Y5.00

Children under four years of age travel free; and those of four years and under twelve, at half fare.

An Express Extra Ticket is good for one continuous ride only.

A sleeping-car is attached to each of these trains and the accommodation is obtainable by paying the following charges:—

Fusan or Nandaimon—Antung	Y5.00
Shingishū or Antung—Chang-chun	Y5 00
Fusan—Changchun	Y8.00

Children under five years of age for whom a separate berth is not required, are free of charge: those under four, who use separate berths, are charged fares provided for children for ordinary fare tickets and Express Extra Tickets, in addition to full charges for sleeping-berths.

Noon in Chōsen corresponds with 11.00 a.m. in Manchuria.

The Triweekly Express Trains, known as the "Chosen-Manchuria Express Service," take excellently equipped Sleeping, Dining, and 1st Class Cars only and are run between Fusan and Changchun connecting with the following Trans-Siberian express trains:—

The Express leaving Fusan for Changchun on Tuesdays .. Wagons Lits for Moscow (Train No. 201)
„ „ „ „ „ Fridays .. State Express for St. Petersburg .. „ „ „
„ „ „ „ „ Sundays .. State Express for Moscow „ „ „
The express leaving Changchun for Fusan on Fridays .. Wagons Lits from Moscow „ „ 202
„ „ „ „ „ Mondays .. State Express from St. Petersburg .. „ „ „
„ „ „ „ „ Wednesdays State Express from Moscow .. „ „ „

The Daily Express Trains on the lines of the Chosen Railway take cars of all classes (1st, 2nd and 3rd) and Dining or Sleeping Cars.

The Fusan-Shimonoseki Ferry Services:—On Monday, Thursday, Wednesday and Saturday.

Station Hotels:—At Fusan, Shingisho and Mukden.

Customs Examination:—At the Antung Station and on board the Fusan-Shimonoseki ferry steamers.

Fusan-Antung.—Besides the above service, two daily express trains are run, morning and night, between Fusan and Keijō, and one between Keijō and Antung. In other words, in addition to the morning express train from Fusan to Keijō and vice versa, the night service starts from Fusan and proceeds to Antung and the train leaving Antung for Fusan every morning turns into the night service from Nandaimon (Keijō). Sleeping-cars (Berth charge: Y. 4.00) are attached to the express trains running through between Fusan and Antung.

Keijo-Jinsen (Chemulpo).—Express trains besides six ordinary trains in both directions make three trips daily between these two places. At Yeitōho and Ryūzan, these trains are regularly connected with the aforesaid express trains on the Keijō-Fusan and the Keijō-Antung lines.

N.B. Cars of all classes are attached to the above express trains on this section.

Ordinary Trains

Sanroshin-Masan.—Trains make five return trips a day. At Sanrōshin, these trains make close connections with those on the Keijō-Fusan line.

Taiden-Kunsan.—(A portion of the projected Konan line). Trains make three return trips daily.

Ryuzan-Rensen.—(A portion of the projected Keijō-Gensan line). Trains make two return trips daily.

Heijo-Chinnampo.—Trains are run thrice a day in each direction.

Ordinary trains on the above four sections take no first class cars.

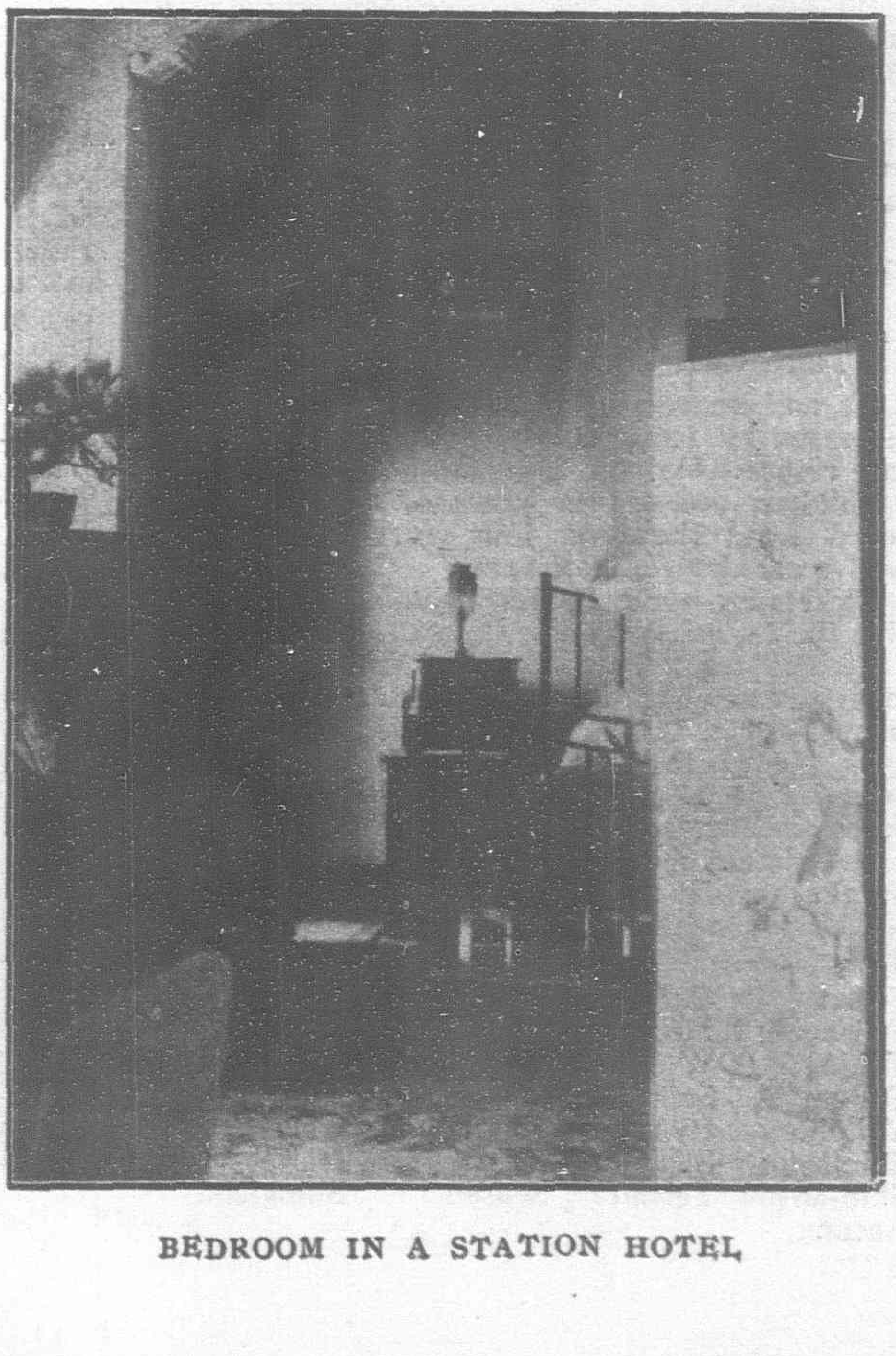
Koshu-Kenjiho.—Trains are run thrice a day from each end.

Heijo-Jido.—Trains are run twice a day in each direction.

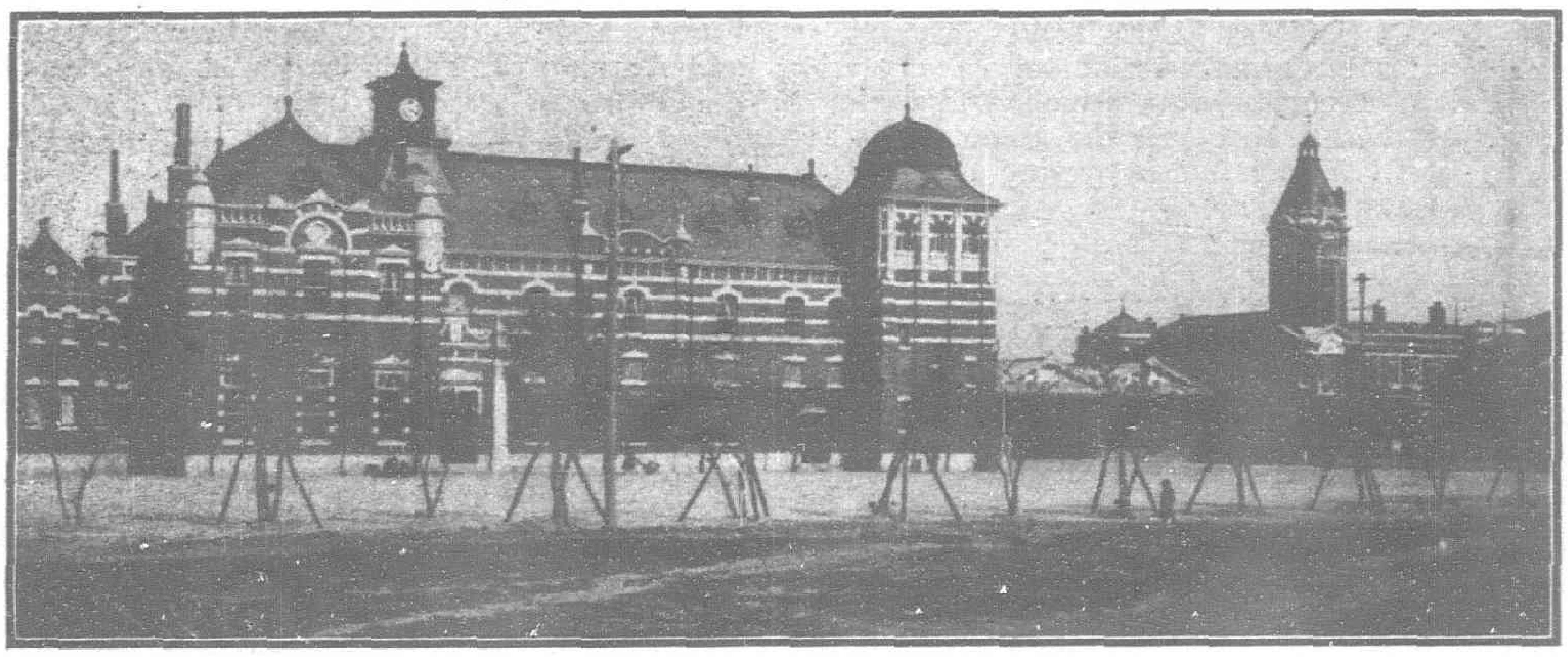
Third Class tickets only are issued for the above two sections.

Sleeping-Cars: Sleeping-cars with the latest accommodation are attached to the tri-weekly through express trains between Fusan and Changchun, and also to the through express train between Fusan and Antung.

Dining-Cars: Dining-cars provided with excellent equipment under direct railway management, are attached to the tri-weekly express between Fusan and Changchun. Express trains on the Keijō Fusan section take dining-cars on which European meals are served on the à-la-carte plan. European meals are also obtainable



BEDROOM IN A STATION HOTEL



RAILWAY STATION AT FUSAN

on the express trains between Keijō and Antung as well as the through trains between Fusan and Antung.

Cars or compartments may be reserved on payment of a sum equivalent to the charges for two-thirds of the seats. If more than two-thirds of the seats are occupied, the additional fare must be paid.

WEAVERS AT WORK

Special Conductors wearing red bands round their arms are on duty on every express train on the Fusan-Keijō or Antung Section to render passengers any assistance.

Train Boys wait on passengers in 1st and 2nd class cars only.

FARES AND TICKETS

Third class fare 2 Sen....:.per mile.

1st and 2nd class tickets are issued at rates increased by 150% and 75% of the 3rd class fare respectively.

Children under four years of age are conveyed free; those of four years and under twelve are charged half fare.

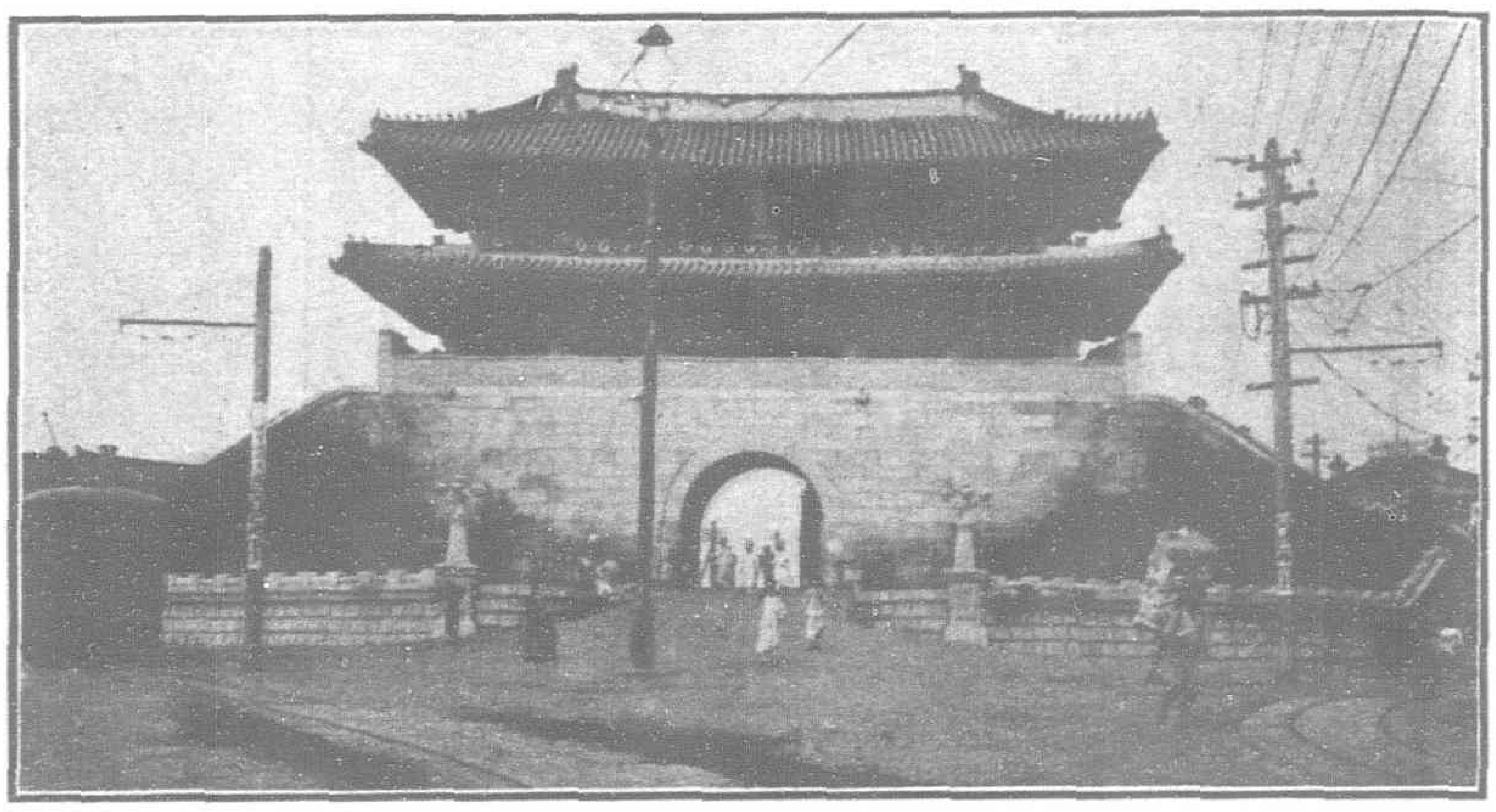
Tickets for not exceeding 50 miles are available the day of issue only.

Tickets for over 50 and not exceeding 100 miles are available two days (including day of issue).

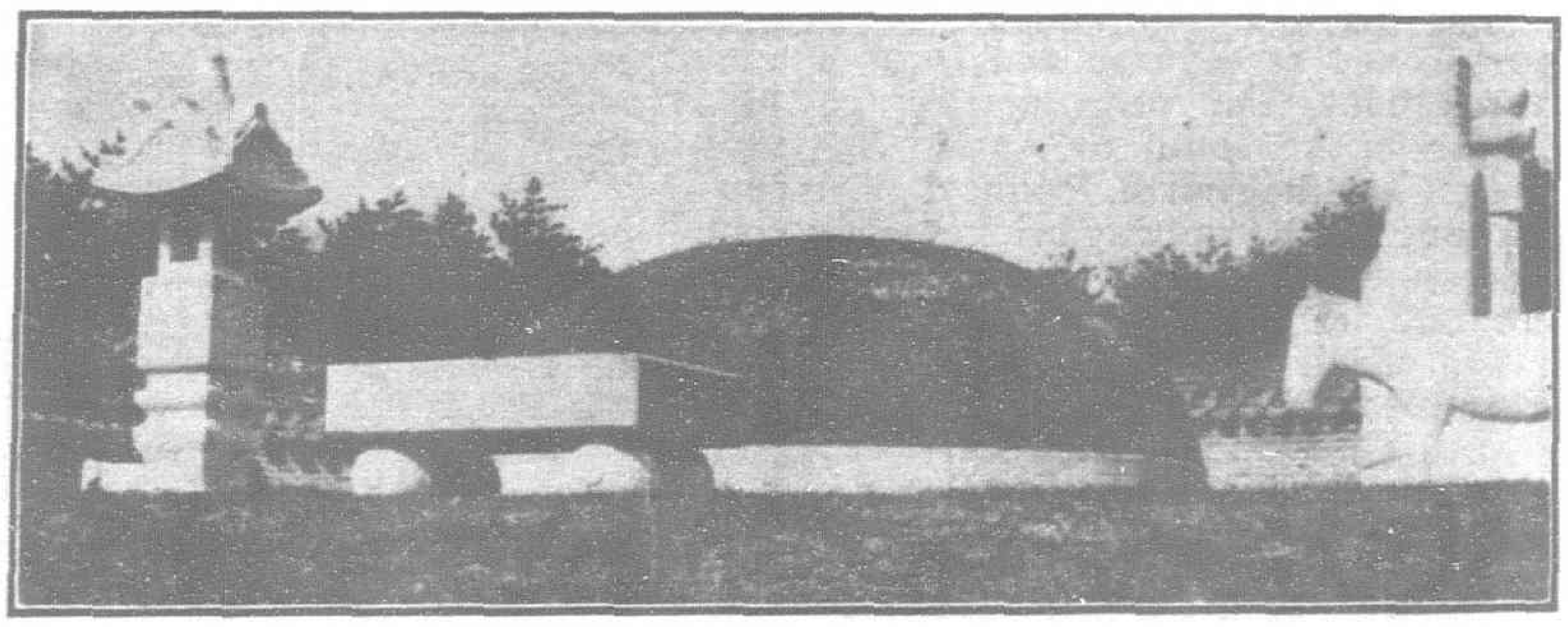
In regard to tickets for over 100 miles one day is allowed for every additional 100 miles or fraction thereof.

Passengers may break their journey at any of the regular stop-over stations mentioned below, within the time-limits of their thickets:—

Fusan
Fusanchin
Yeidō
Ten-an
Yeitōho
Shimbaku
Shin-anshū
Antung.
Sōryō
Mitsuyō
Waikwan
Seikwan
Ryūzan
Shari-in
Teishū
Kiho
Taikyū
Taiden
Heitaku
Nandaimon
Kōshū
Sensen
Sanrōshin
Kinsen
Chōchi-in
Suigen
Kaijō
Heijō
Shingishū



SOUTH GATE KEIYJO (SEOUL)



A QUEEN'S TOMB NEAR KEIYJO (SEOUL)

For a party of not less than 25 persons travelling in the same train over a distance not less than 20 miles in a single trip, the fares may be discounted as follows:—

(*See Table A*)

Table A

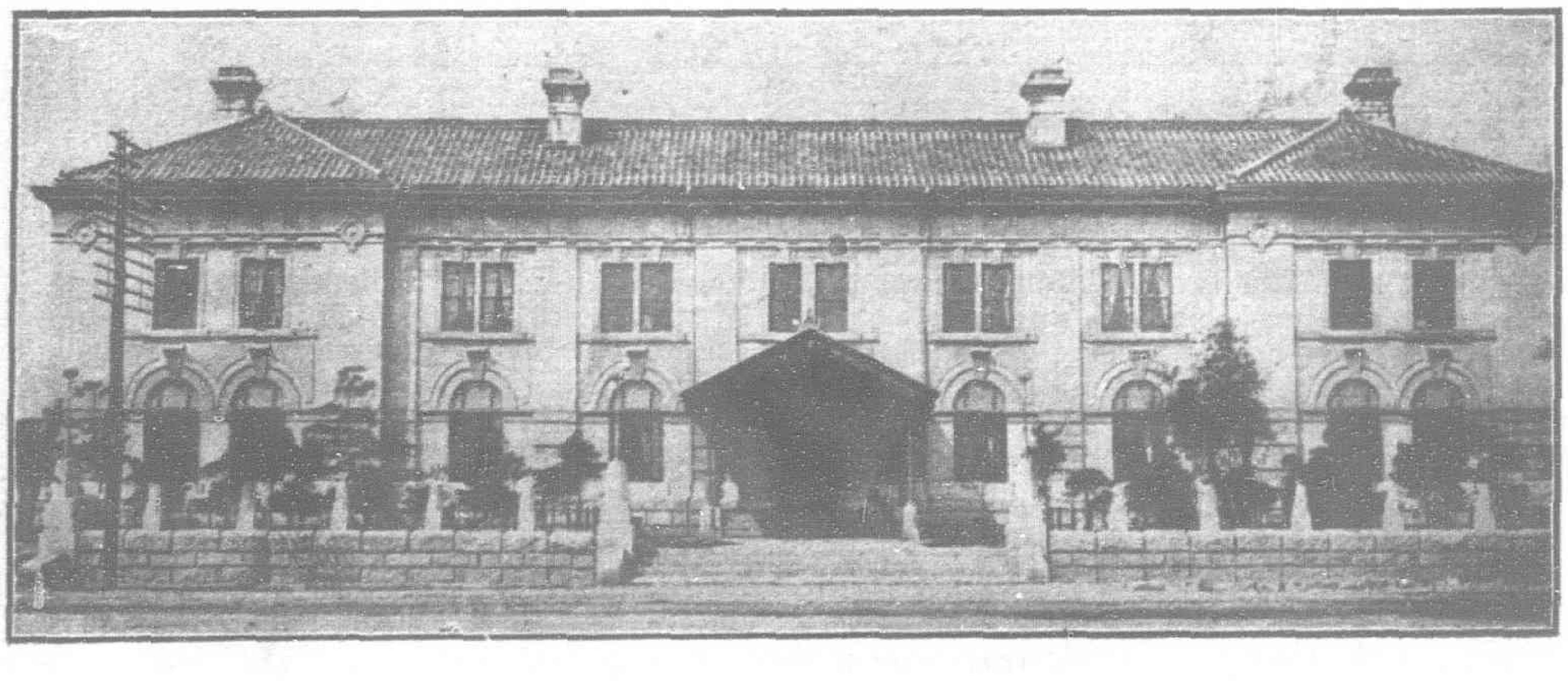
Mileage: No. of Persons	under 50 m.	under 200 m.	200 m. & over
25— 50	20 %	25 %	30 %
50—100	22½%	27½%	32½%
100—200	25 %	30 %	35 %
200—300	27½%	32½%	37½%
300—500	30 %	37½%	40½%
over 500	35 %	42½%	50·%

Passengers are allowed the following quantities of personal luggage free of charge:—

100 kin (about 133 lbs.) for a 1st class passenger
60 ,, (,, 80 ,,) ,, 2nd ,, ,,
30 ,, (,, 40 ,,) ,, 3rd ,, ,,

The authorized Ticket Agencies are Messrs. Thos. Cook & Son and the International Sleeping Car & Express Trains Company.

Inquiry offices are provided at the principal stations on the line for information regarding the service of trains, selection of routes, connections at junctions, passengers' fares, luggage, parcels, goods rates, etc.



CHOSEN COMMUNICATIONS BUREAU

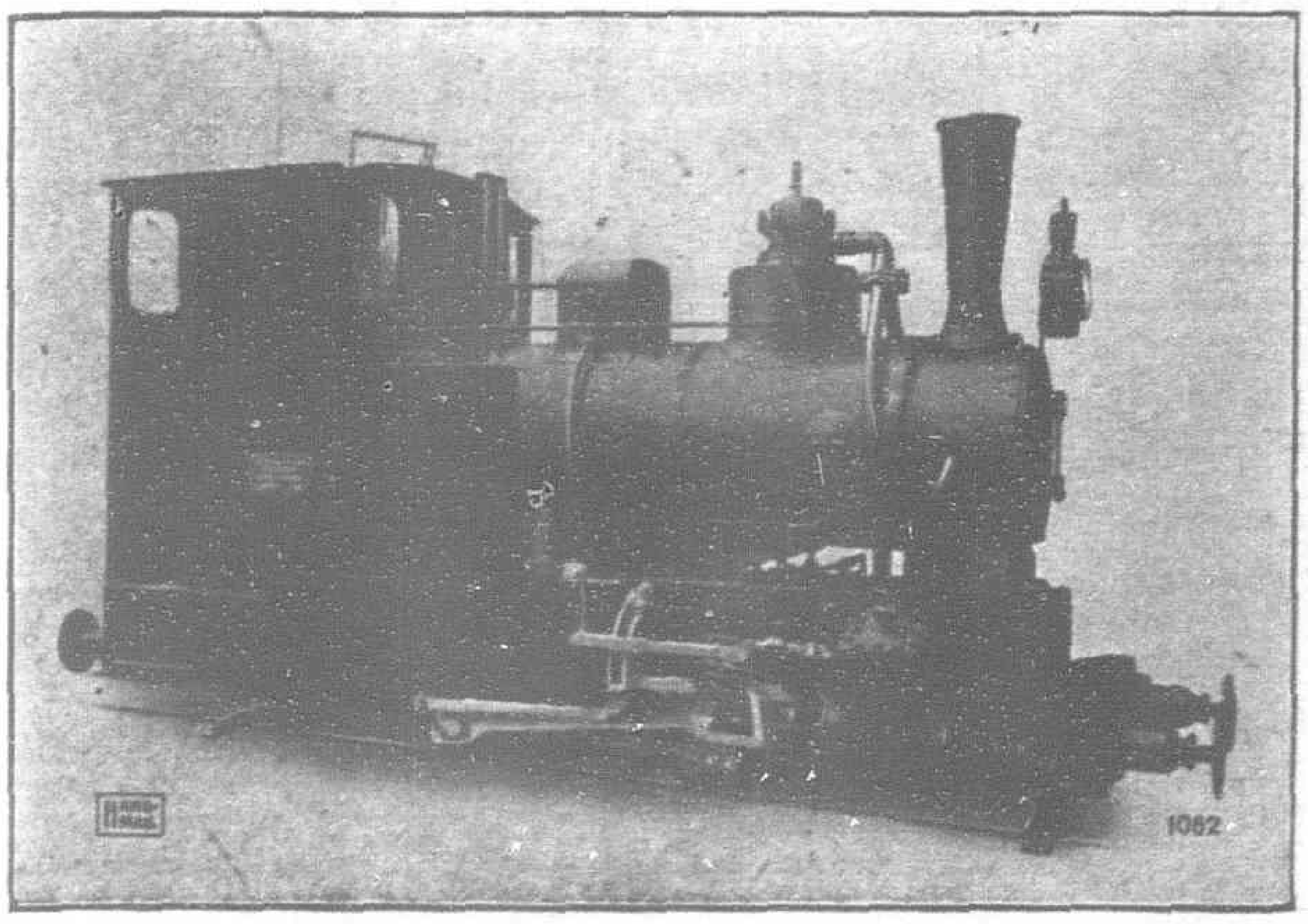


FIG. 1

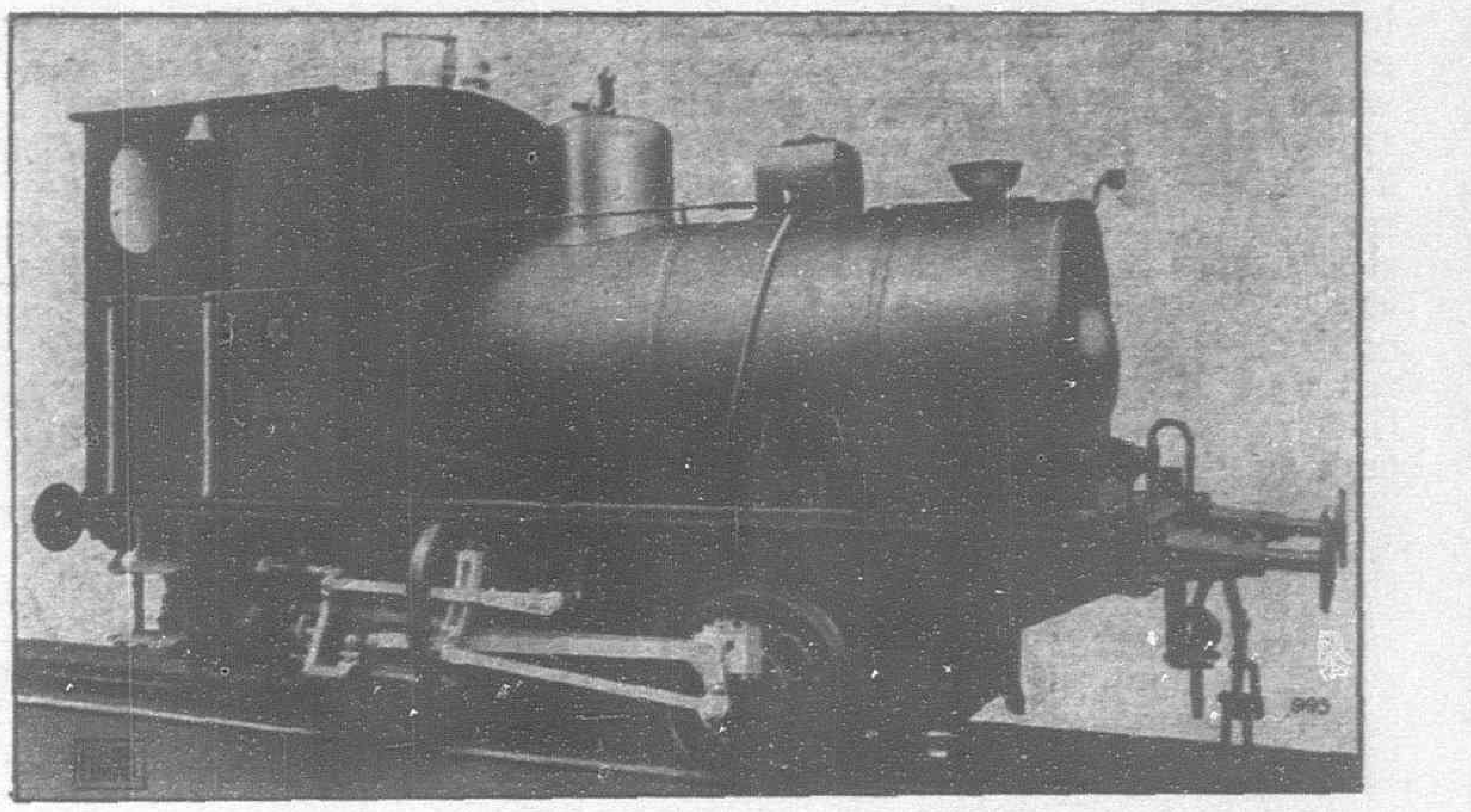


FIG. 2

LOCOMOTIVES

HANNOVERSCHE MASCHINENBAU-ACTIEN-GESELLSCHAFT, VORMALS GEORG EGESTORFF, HANNOVER-LINDEN.

(General-Agents for China: H. DIEDERICHSEN & Co.)

Locomotives of all sizes and for every gauge of line are built in the Works of the Hanomag. *Fig. 1* shows a 50 H.P. narrow gauge locomotive for constructor's use, such as are commonly used for the transport of earth on excavating work and for building purposes. In constructing such locomotives it must first of all be taken into consideration that sharp curves even in badly laid tracks must be negotiated without the least difficulty. On account of the light section of rails generally used on such temporary tracks the axle pressure must be reduced as far as possible, the boiler must not be too high, so that the danger of the engines' toppling over may be obviated if the latter enters a curve at a high speed. As for the rest, all parts must be as simple as possible, because as a rule no special care can be taken in handling such engines. Complicated parts have, therefore, to be strictly avoided when building such engines. In building the locomotive shown in fig. 1 these points have been strictly observed. In order to allow the driver to have an unimpeded view of the track in front of him, the feed water is stored in tanks built between the frame plates, which tanks help at the same time to stiffen the latter.

A particularly interesting locomotive of a special type is shown in *fig. 2.* This is a fireless locomotive such as the Hanomag has placed on the market, a great number of which are giving the best satisfaction in service. The boiler consists solely of a water tank filled to two-thirds of its capacity with water and protected by special insulating materials from loss of heat through radiation. The working of this engine is as follows:

The water tank is first heated by introducing into it steam from a stationary boiler plant. As soon as the pressure of the steam in the tank has nearly reached that of the stationary boiler plant the supply of steam is cut off. The engine can then be placed in service and perform work corresponding to the amount of heat introduced into the tank. The latter has to be recharged in intervals of 2 to 6 hours according to the conditions of service. The loss in pressure of the steam brought about by radiation is quite insignificant, as has been proved by experience.

Fireless locomotives of this kind have speedily found a ready market in works where the danger of fire exists, such as powder and ammunition factories and gas works and have proved to be greatly advantageous in industrial concerns where shunting work is light. The danger of the boiler of an engine of this kind exploding is of course reduced to nil. No attention need be paid to the boiler after it has been charged with steam.

Fig. 3 shows a 4-6-0 type of express train engine and tender with two four wheeled bogies, which locomotive has been designed and supplied by the Hanomag for the Tientsin-Pukow Line of the Chinese State Railways. The construction of this engine is fully adapted to the particular requirements on Chinese Railways. The boiler is fitted with a specially large grate and fire box in order to ensure its good steaming capacity.

Fig. 4 shows a very remarkable type of locomotive. This is a 2-12-2 type of goods locomotive for 1067 mm gauge which has been designed and constructed by the Hanomag to the order of the Dutch State Railways, Java. The greatest wheel pressure admissible on lines of these latter railways is 4,750 kilos, whilst curves as sharp as 140 m in radius have frequently to be taken. The engine was adapted for taking curves with ease without having recourse to complicated expedients, by simply giving side play to the first and sixth coupled axles which are constructed on the Gölsdorf principle. The flanges of the wheels of the two middle axles were turned down 5 mm more than the others. A lateral play of the first and last coupled axles of 30 mm on each side, sufficed to allow of the engine taking the curves with the necessary ease. This engine has given splendid satisfaction in service. The locomotives took the curves with the greatest ease. In the case of this large

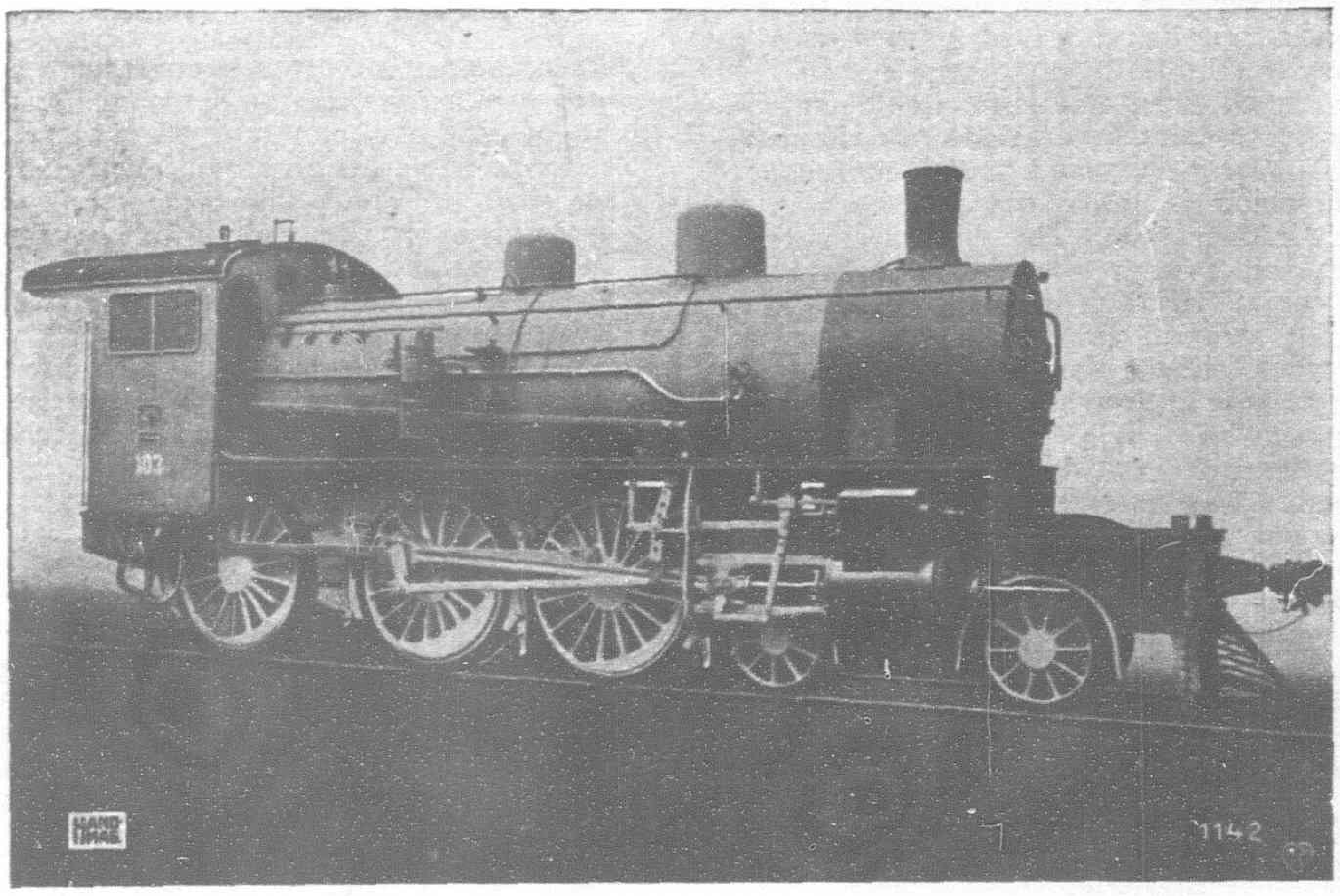


FIG. 3

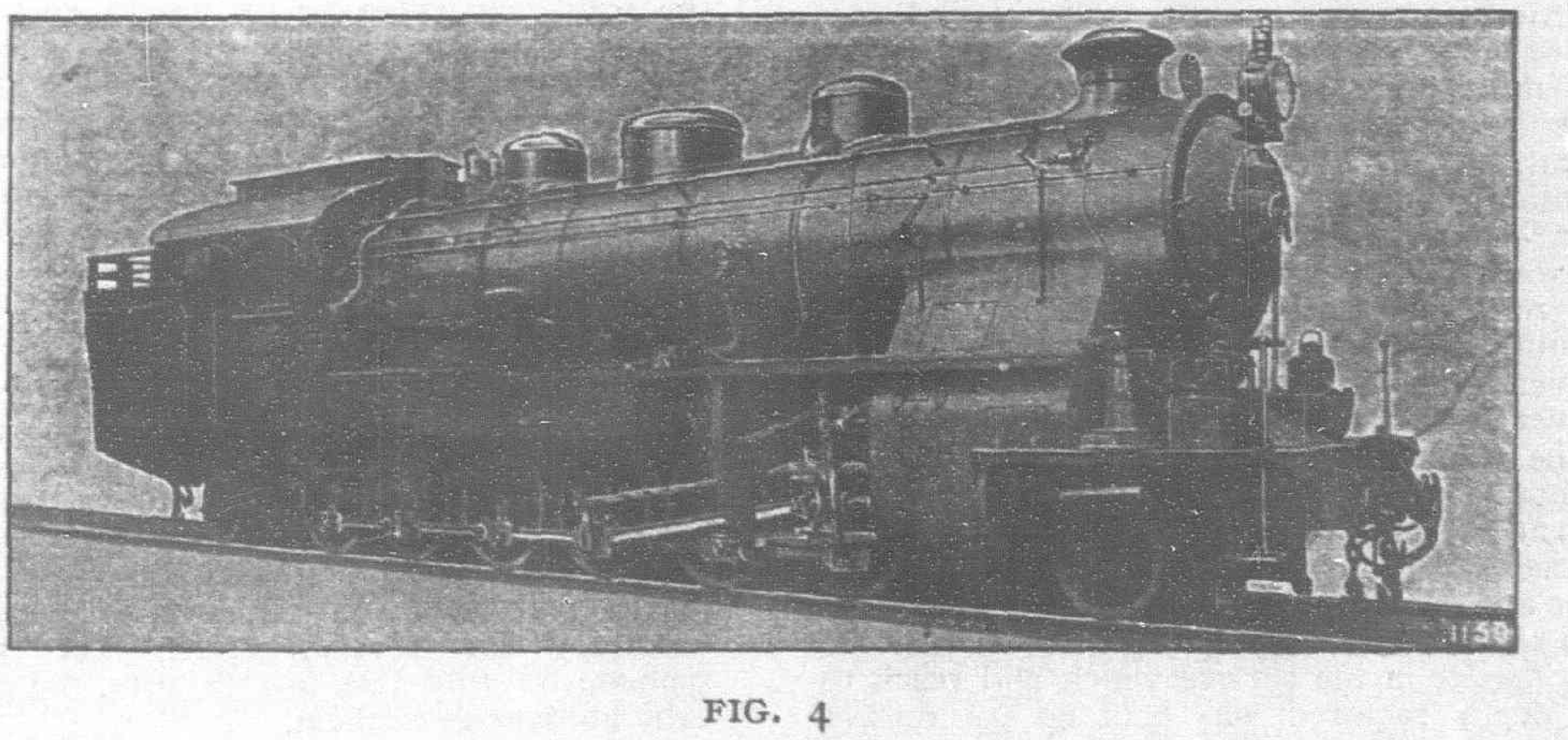


FIG. 4

locomotive as well, the driver is given an unimpeded view of the track before him, the water supply being placed partly between the frame plates and partly underneath the boiler. The boiler is placed comparatively high, so that the staybolts are easily accessible and the supply of air to the grate is excellent. The engine is fitted with a smoke tube superheater of the Schmidt type, which is calculated to obtain a mean temperature of superheat of 320° C. The engine just described which has been built to the designs of the Hanomag, proves that twelve couplers can also be used without difficulty on lines with light permanent way and sharp curves.

PHILIPPINES PORT WORKS

ANNUAL REPORT OF BUREAU OF NAVIGATION

Following is the report of the director of the bureau of navigation on the activity of the port works division during the fiscal year 1912:—

By Act No. 2059 passed on February 3, 1911, P. 500,000 was appropriated for the improvement of ports, dredging of navigable rivers and canals, and other similar specified purposes, allotable in the discretion of the director From this appropriation allotments have been made during the fiscal year 1912 as follows:

For the improvement of the port of Manila by the construction of roadways and drains in the port district	P.87,892.54
For the completion of the river wall at Iloilo	60,000.00
For dredging in Manila Harbor	150,000.00
For building two small steel dumping scows	15,000 00
For repairs to Manila breakwaters.	10,469.90
For completing harbor improvements at Bais, Oriental Negros	17,000.00
For building a small wharf at Larena, Siquijor Island	4,000.00
To complete construction of the Cagayan River snag boat	32,637.47
For dredging in Manila esteros	26,000.00
	P. 403,000,00

MANILA DREDGING

Special attention has been given to the dredging of the old esteros of the city of Manila to make them navigable for small craft and improve sanitation. Two hundred and sixty per cent. more work of this nature has been done during the fiscal year 1912 than during the previous fiscal year, and we now have 5,300 lineal meters (3.3 miles) of esteros navigable at low tide by loaded cascos, and an additional 1,600 lineal meters navigable at mean tide, a total of 63 per cent. of the 10,980 lineal meters which have been selected for improvement for navigation. The actual number of cubic meters of material removed was 128,118 representing an increase of 50 per cent. over the amount dredged from Manila esteros in all the previous years of American occupation combined. Some of this material has been deposited on low lands in the vicinity of the work, but in most cases it must be towed out to the sea and dumped because of our inability to prevail upon any one to take delivery of it from the most convenient delivery points as a gift, for filling purposes.

The channel of the lower Pasig river was maintained at a depth of 18 feet, there having been an increase of 21 per cent. in the amount of material removed from this portion of the river and the outer bar.

In the outer harbor, due to the fact that the only dredge in the service which will reach to the depth required was held up for repairs nearly five months and was absent at Iloilo an additional 2½ months, there was a decrease of 36 per cent. in the amount of material moved. On December 11, 1911, the director allotted P. 150,000 for dredging to continue the deep water area in the outer harbor southward with a proviso that the material removed should be deposited behind the Cavite boulevard retaining wall. Bids were advertised for and a contract for the work signed and approved on May 3, 1912. Operations had not yet been started at the end of the fiscal year and probably will not be until after the typhoon season.

The work fell off 60 per cent. in the upper reaches of the Pasig river because of the withdrawal of one dredge for estero work, and the extremely poor condition of repairs of the one left there, no funds being available for the construction of a new steel hull to replace the present worn out wooden structure.

Heavy repairs will be required on the dredges and other floating plant next year if they are to continue in service.

MANILA PORT DISTRICT

It is provided by the law that the streets on land reclaimed by the insular government shall be constructed by the insular government, and maintained by the municipality in which they are located. In accordance with this law there has been allotted during the last two fiscal years from port works funds for the construction of streets curbing and storm water drains in the port district, city of Manila, a total of P. 126,892.54, practically all of which has been expended. As a result, the street system in our new shipping district is beginning to take definite form. It is to date sufficient for the needs of the three large piers and the completed structures in the district, but at the rate the blocks are being leased it will soon be necessary to materially extend the system.

A force of men has been employed continually on repairs, alterations and improvements at steel piers 3 and 5, the maintenance cost of which is taken out of the receipts from their operation. The division exercises a general supervision over the construction by private capital of plant abutting on the inner basin, for general marine construction and repair work. This plant will include marine railway capable of docking vessels of 3,000 tons displacement, two smaller railways for launches and smaller craft, machine shops and foundry, construction was started in February 1912. At the close of the fiscal year the large marine railway was approximately fifty per cent., and the machine shop buildings twenty-five per cent., completed. No work had been done on the smaller railways. This plant will be able to handle any interisland boat and many of the foreign vessels calling at Manila, and if able to compete with Hongkong yards for extensive repairs should be the means of keeping in the Islands large sums of money now expended abroad.

CAVITE BOULEVARD

No additional funds were provided for work on the Cavite Boulevard, and the contractors have only worked intermittently on repairs to the wall. No extension in length was made. Of the total funds so far provided, there remained unexpended on June 30, 1912, P. 47,336.94, most of which it is estimated will be required to put the wall in good condition, including the crushed stone backing in preparation for the back fill, after the typhoon season.

MANILA BREAKWATER

The work on the south breakwater which was reported under way in our last annual report was completed in October, 1911, and the superstructure wall on the west breakwater has been brought up to grade. The breakwaters are now in very good condition throughout their entire length and no extensive repairs should be necessary for several years. The severe typhoon on July 14th to 17th, 1911, did practically no damage to them.

PASIG RIVER WALLS

The back filling behind the two new sections of wall constructed on the south bank of the river last year was completed in September, 1911, and repairs to the old Spanish wall have been made at various points in the lower river. They are now in fairly good condition and should require no extensive repairs for at least a year.

ILOILO HARBOR IMPROVEMENTS

The extension of the reinforced concrete wharf on the south side of the Iloilo River was continued by the administration throughout the 12 months. At the close of the year 346 lineal meters of wharf had been completed and 51 meters partially constructed, the whole equivalent to about 365 lineal meters of completed wharf, the cost to date approximating P. 515.00 per lineal meter. It is estimated that the entire 638.5 meters of improvement contemplated (241.5 meters of retaining wall and 397 meters of wharf) will cost less than P. 400,000 So much benefit has been derived from, and so much handling expense saved through the wall and wharf constructed, that a petition to extend the work to the upper reaches of the river, signed by practically all the shippers in that district, has been received. If funds become available, such an extension would be of great value.

Dredge No. 1 was dispatched from Manila to clear out the bed of the lower river which had silted up considerably. Owing to the urgent need of the dredge at Manila time was taken to clear only a comparatively narrow channel from the bar by the removal of 90,280 cubic meters of material, and redredging will be probably necessary in the near future.

CEBU HARBOR IMPROVEMENTS

On August 10, 1911, a contract was entered into with a construction company for the building of 250 lineal meters of plain and reinforced concrete wharf as an extension to the existing sea wall at Cebu. The contractor's plant was assembled on the ground about the last of September and active work commenced during October. At the close of the year the work was progressing satisfactorily, four large standard piers and one small pier having been completed and the foundation driven for a fifth large pier. The wharf will accommodate vessels of thirty feet draft.

BAIS HARBOR IMPROVEMENTS

The improvements at the port of Bais, Oriental Negros, which will serve a large sugar producing section, described in our previous report, were completed about May 1, 1912. The cost of the work, P. 67,000.00 considerably exceeded the first allotment on account of the elaboration of the scheme after the project was made under way.

PANDAN HARBOR IMPROVEMENTS

Nine hundred lineal meters of the right bank of the Abra River at Pandan, the port for Vigan, Ilocos Sur, were revetted as a protion against erosion at an approximate cost of P. 31,800.00 allotted by the director. The revetment placed aggregated 5,740 square meters, some 10,000 cubic meters of stone delivered on the site of the work having been used therein. Five thousand five hundred cubic meters of sand and gravel back fill were used in indentations in order to secure proper alignment.

CAGAYAN RIVER IMPROVEMENTS

The combination snag boat, dredge and pile driver built by the bureau of navigation to maintain the channel of the Cagayan river and protect its banks reached Aparri on April 18, 1912. The river being subject to terrific floods when all craft must seek shelter, the first project completed was the creation of a harbor of refuge for the snag boat herself and other craft. This was practically all that had been accomplished to the end of the year.

FAR EASTERN RAILWAYS

China's Trunk Lines.—The Chinese Ministry of Communications has proposed four trunk lines, two running north and south and two running east and west, through the country. The proposal was submitted to the members of the Cabinet and met with their approval.

I: the Central longitudinal line, beginning from Mongolia running through Peking and Shansi, turning southward to Hankow and thence to Chinlung. Peking is to be the centre of this line.

II: the Eastern longitudinal line, beginning from Manchuria, passing through Chihli, Shantung, Kiangsu, and Chekiang and ultimately reaching Fukien and Kwangtung.

III: the Northern latitudinal line, beginning from Haichow passing through Honan and Tungkuan and Kansu and thence to Ili meeting the Central Asiatic Railway (?).

IV: the Central latitudinal line, beginning at the Nanking terminus of the Nanking-Shanghai Railway passing through Wuchang, entering Szechuan.

Siam Railways.—The Petchaburi line, Siam, will be placed under the control of the Southern Line administration, of the Royal State Railways, from the 1st April next. This change was inevitable, the line to Petchaburi being merely a section of the Southern Line.

Heilungkiang-Mukden Line.—The long pending issue of constructing a Chinese railway from Heilungkiang either to Tiehling or Kaiyuan appears to have been shelved after all in favour of the proposed construction of a line between Heilungkiang and Mukden, reports the *China Critic*. The Chinese authorities have evidently avoided disappointing the people of either Tiehling or Kaiyuan which two towns regard each other as a rival. Moreover, it would be only natural for them to choose having this new railway connected with their own line at Mukden rather than with the S. M. Railway at Tiehling or Kaiyuan.

Chekiang Railway.—The construction of the Ningpo-Shaoshing section of the Chekiang Railway is proceeding apace at this end of the line, writes a Ningpo correspondent. Metals have been laid to a distance of about fifteen *li*, and a construction train is kept busy in the transport of materials. The station platforms are being put into shape, and it is reported that trains will be running to Shaoshing early in the summer of 1913. It is difficult to obtain accurate information as to the condition of the funds. Much of the money promised in the shares issued two years ago has certainly not been forthcoming, and recent endeavors to get more shares taken up have not been successful. No beginning has yet been made with the important bridge over the Pahkuan river, but it is at least likely that at the present rate of progress trains will be running in 1913 between Ningpo and Yuyao.

A correspondent writing to the *China Press* on December 3 said:—There is now a train running from Ningpo, at the salt gate, where the station is, to Bah-Saw and further on every day, sometimes twice a day. The fare to Bah-Saw is five cents. Hundreds of Chinese travel by it "just for the fun of the thing." It is said that the train soon will be making trips twice daily to Sze-hze, a place some thirty miles from Ningpo. They are building the station at Ningpo and will begin these trips at Christmas.

SHANGHAI-NANKING RAILWAY

The following figures of traffic returns (approximately) for the week ended November 23, were issued by the Shanghai-Nanking Railway:—

Year.	Passengers.	Goods and Sundries earnings	Total.
	$	$	$
1912	43,583	10,306	53,889
1911	36,358	7,503	43,861
Increase	7,225	2,803	10,028
Decrease	—	—	—

For forty-seven weeks.

Year.	Passengers	Goods and Sundries	Total.
	$	$	$
1912	2,019,286	368,765	2,388,051
1911	1,676,623	280,491	1,957,114
Increase ...	342,663	88,274	430,937
Decrease ...	—	—	—

For the week ended November 30:—

Year.	Passengers.	Goods and Sundries earnings	Total.
	$	$	$
1912	45,152	7,566	52,718
1911	36,150	5,700	41,850
Increase	9,002	1,866	10,688
Decrease	—	—	—

For forty-eight weeks.

Year.	Passengers.	Goods and Sundries.	Total.
	$	$	$
1912	2,064,438	376,331	2,440,769
1911	1,712,773	286,191	1,998,964
Increase ...	351,665	90,140	441,805
Decrease ...	—	—	—

For the week ended December 7

Year.	Passengers.	Goods and Sundries earnings.	Total.
	$	$	$
1912	43,153	10,567	53,720
1911	50,986	6,295	57,281
Increase	—	4,272	—
Decrease	7,833	—	3,561

For forty-nine Weeks,

Year.	Passengers	Goods and Sundries earnings.	Total.
	$	$	$
1912	2,107,501	386,898	2,494,489
1911	1,763,759	292,486	2,056,245
Increase ...	343,832	94,412	438,244
Decrease ...	—	—	—

Hokuriku Line.—The railway service between Nadachi and Itoigawa, Japan, a distance of some 16 miles, on the Hokuriku line was to be opened to the public on December 8. With the section opened the entire Hokuriku Railway will be ready for traffic except between Itoigawa and Aomi, about three miles, which will not be opened till next February, owing to difficulties of construction.

Kyoto Station.—The Railway Board of Japan has a project to erect a new and enlarged station in Kyoto in place of the present one at an outlay of three million yen, which is included in the next year's Budget. The site of the new station will be a little to the south of the present one, and will cover about an acre.

Hokkaido Railway.—The express service on the Hakodate-Kushiro section of the Hokkaido Railway line, which was opened last June, was to be suspended on and after the 1st of December owing to the setting in of the snow season.

Japanese Government Railways.—The receipts of the Japanese Railway Board for the current year are calculated from the figures collected up to the end of October to show an increase of 8,000,000 *yen* over the estimated amount of 100,092,658 *yen*. The next fiscal year's estimate of revenue from the same source will therefore be placed at over 110,000,000 *yen*.

Tokyo-Narita Line.—The first section of the Keisei Electric Railway between Oshiage (Honjo, Tokyo) and Ichikawa, Chiba Prefecture, Japan, was opened to traffic on November 3. The line, which is to be extended to Narita in future, starts from Oshiage near the starting point of the Tobu Railway, and touching at Hikifune, Yotsugi, Tateishi and Magane, extends to Ichikawa. A branch line between Ichikawa and Shibamata was also opened the same day. Among noted places along the line are Konodai Hill, a famous old battlefield near Ichikawa, the peach orchards at Ichikawa, the Yoshino Garden at Yotsugi noted for iris, and other flowers, the Taishakuten Shrine at Shibamata, and the plum trees at Kinegawa, near Oshiage. The hand-car tramway between Kanamachi and Shibamata will be purchased by the company and converted into an electric line.

New Japanese Railway.—The Imperial Japanese Government Railway between Tsuruga (port for Vladivostok) and Shin Maizuru will not be opened before 1914, owing to engineering difficulties, several tunnels having to be bored. All land between the termini has been purchased and survey work is nearing completion. Construction began in October on the Kohama section, and work on the Tsuruga-Minami-Saigo section will begin before the end of year. The opening of this line will effect an extraordinary economic change in this region, hitherto only accessible by boat or long journeys overland.

SOUTH MANCHURIA RAILWAY

The account department of the South Manchurian Railway Company is now busy preparin an estimate of expenses for the fiscal year. It is expected that the large sum of yen 15,000,000 is needed to carry on the undertakings of new industries of the company, but that such an amount cannot be secured from the balance money from shares. Either new shares or debentures must be issued to make up the deficiency. The company, however, has not yet decided what steps to take, and it is necessary to secure the consent of the Government for the proposed expenditure for the fiscal year before new shares can be issued.

The South Manchuria Railway was to distribute on December 12 to its shareholders according to the Shareholders' Register, as it stood on December 1, a sum of money amounting to half the annual dividend at the rate of 6%.

The coke factory, constructed at Chiencinchai on the plans drawn up by Mr. Suzuki, Manager of the South Manchuria Railway Company's Gas Department, has had all machinery and other interior equipments installed. The railway siding from the Fushun Colliery to the factory is not completed yet, and the unfinished work is likely to be resumed early in spring.

Accordingly the factory itself will not start operations before spring. The factory will be capable of putting out 10 tons of coke a day. The output is to be offered for sale among the Chinese at Mukden. Liaoyang, Yingkou, Tiehling Changchun, &c.

The principal works proposed to be undertaken by the South Manchuria Railway Company in 1913 are the construction of harbours at Dairen, and the improvement of rolling stock and tracks. The *Asahi* learns that the new works of the company will not be postponed—as seems to be believed by many—as the result of the negative financial policy of the Government. It is the bounden duty of the Company to perfect the railway accommodation in Manchuria, and works to this end cannot be allowed to be neglected even for a day, in order to develop the resources of Manchuria. For these reasons, it is confidently asserted that the Company will carry out its projected works, quite independent of the financial policy of the Government in Tokyo. In the event of funds at the command of the company falling short, the directors will not hesitate to issue the shares which are held in reserve.

The further extension of the market for Fushun coal has been occupying the attention of the Company as the output of coal increases. The Company is now shipping the coal to Korea and Formosa in addition to North China. The projected extension of sale to Japan Proper has been abandoned, as it is considered inadvisable to open competition with the collieries in Japan Proper and inexpedient for a semi-Government company to "oppress" private business companies. The Company has, therefore, decided to ship coal to South China and Singapore next spring. But when Fushun coal is exported to South China, Singapore, and other places, remarks the Osaka journal, competition will be entered upon with the collieries in Japan Proper, which make these places their principal foreign markets.

The South Manchurian Railway Traffic Returns for the month of November give Y. 1,760,198 being an increase by Y. 243,159 over the corresponding period of last year. The aggregate earnings since last April, the beginning of the present fiscal year, are Y. 10,064,584 which sum is larger by Y. 949,319 than the aggregate figure for the corresponding period of last year.

The 64 lb. rails which were used by the Russians in the construction of what now forms the main line of the South Manchuria Railway have been replaced by 80 lb. rails by the S.M,R. management in the section lying south of Mukden and another section between Szupingkai and Shuangmiaotzu. The same management has the 5 mile section between Changtu and Manching being replaced with 80 lb. rails during the present fiscal year. It will attend to the about 12 mile section between Manching and Shuangmiaotzu during the next fiscal year. The remainder will also receive its attention in the succeeding years.

The South Manchuria Railway designs to found a new slaughter house at Mukden, at the coast of $25,000, and intends to import and kill Mongolian cattle and thus to offer good beef to all markets in South Manchuria.

Kirin-Changchun Railway.—The *Manchuria Daily News* of November 21 reported that about 10 carloads of Tobacco leaves were arriving daily at Changchun by the Kirin-Changchun Railway, and were being transported to Mukden and Yingkou. One or two carloads of medicinal herbs and hemp were arriving daily at Changchun from the same source. About the same quantity of Kirin timber was arriving there daily.

The revised train schedule for the Kirin-Changchun Railway, came into operation from November 25 as follows:—

East Bound

	Express.	Ordinary.
Lv.—Changchun........	7.00 a.m.	2.00.p.m.
Ar.—Kirin	11.30 „	8.15 „

West Bound.

Lv.—Kirin	6.00 a.m.	2.40 p.m.
Ar.—Changchun........	11.10 „	7.20 „

The Korean Railways:—The railway authorities of the Government-General of Korea have ordered twelve locomotives of a new pattern from an American firm in New York. The *Seoul Press* learns that the same authorities, having found it necessary to increase the number of freight cars, are now having 165 cars constructed at the workshops at Yongsan and Cholyang. These cars are expected to be completed by the end of March next. By placing the new cars on the service the authorities hope to increase the transport capacity by about 20 per cent.

Seoul-Wonsan Railway. — The opening ceremony of the Yonchon-Cholwon section of the Seoul-Wonsan Railway, fifteen miles in length was successfully held on October 26 at Cholwon, in the presence of Count Terauchi, Governor-General. A special train was run from Nandaimon station carrying some two hundred guests specially invited for the occasion. The distance between Seoul and Cholwon is some 61 miles with ten intermediate stations, and is reached in four hours by train. It will be remembered, says the *Seoul Press*, that the distance was formerly barely covered in three days, the road being bad and the means of communication imperfect. It may also be noted in this connection that Cholwon is situated on a vast extent of highland, covering an area of some 69,000 *cho*, with a comparatively small population of only 27,000 forming 6,100 households. The train arrived at Cholwon at 1.30 p.m. and the guests were immediately ushered into a temporary saloon specially provided for the occasion. It was built up of railway sleepers and was an object of general approval as an excellent example of resourcefulness. After a short address by Dr. Ohya, Director of the Chosen Railway Bureau, His Excellency the Governor-General spoke for a while and proposed a toast which was heartily responded to. The guests were then entertained to a cold collation.

Kirin-Hoireng Line.—It is understood that Japan intends to proceed forthwith the construction of the Kirin-Hoireng Railway, which will be the last link in the military defences of Korea and South Manchuria.

Yalu Railway Bridge.—The suspension of the operation of the swing-bridge of the Yalu Railway Bridge to the reopening of the Yalu to navigation next spring was announced by the Government-General of Chosen on November 25.

Burma Railways Dividend.—The final distribution of 1½ per cent. is recommended by the Burma Railways on account of surplus profits for the year ended June 30, 1912. This, with the previous distribution of 15s. per cent., brings the total surplus to £2 5s. for the year, which with the guaranteed interest of £2 10s. makes a total yield of £4 14s. for the year, income tax being deducted before payments.

Railroad Manager Wanted.—Applications are invited for the position of general manager of the New Zealand Government Railways. The salary is $15.000 U.S. Currency a year, and the term of appointment five years. Further particulars and forms of application may be obtained from the High Commissioner for New Zealand, 13 Victoria Street, London, S.W., England. The New Zealand Government railway system includes 2,750 miles. The revenue in 1910 was $15,816,000 and the expenditure $10,550,000, the goods carried 5,490,000 tons, the passengers numbering 11,141,000.

The Tcheng-tai Railway.—According to the returns to September 15 last the earnings of the Tcheng-tai Railway (from Shihchiachaung, on the Peking-Hankow line to Taiyuan-fu, the capital of Shansi province) are recovering from the effects of the Revolution. The line was commenced in 1904, and in October, 1907, was opened for traffic over its whole length of 151 miles. The receipts for 1910 were $1,756,493.46, whilst for 1911 they fell back to $1,416,699.61, though 1912 (to Sept. 15) saw a recovery of some $324,601.07 over the 1911 returns, the total for this financial year being $1,741,300.68. From September 10 to 15 the receipts from passengers carried were $14,278.90 whilst from goods the returns were $25,145.30.

Shantung Railway Company.—A Tsingtau despatch reports that the Shantung Railway Company will grant rebates on freight rates of from 20 to 40 *per cent.* from January next, in competition with the Tientsin-Pukow Railway.

The Hukuang Railway.—The Hunan section of the main line is again making progress. A party of British engineers left Tientsin on November 20 for the survey—interrupted by the revolution—near Chenchow. Mr. Tan Jenfeng, addressing the shareholders, argued that the expenditure of 6,500,000 (? $) on the short line already completed showed the need of foreign supervision. The Tutuh concurred and the shareholders applauded.

Freight Cars.—Telegrams from Shanghai, Chinkiang, and other places to the Board of Communications state that the number of freight cars on the various railway lines is far from sufficient for the traffic and urge strongly an increase in the numbers.

PERSONAL

Mr. T. Aiga, outgoing Civil Administrator, of Dairen was one of the oldest officials of the Kwangtung Government, having been appointed secretary as far back as 1905, preliminarily to the organization of the Kwangtung Government. In South Manchuria he first took charge of the Chinchou Branch of the Dairen Civil Administration. He demonstrated his executive ability by the extermination of powerful gangs of bandits which had been terrors to the northern part of the Leased Territory. The credit for paving the way to the complete elimination of brigandage from Kwangtung is due to his thoroughness in detail. He was subsequently transferred to the Ryojun Civil Administration as its chief, and then to the Dairen Civil Administration about a year and a half ago.

M. Cazenave, Manager of the Bank of Indo-China, left Peking on December 8 for Paris.

Col. B. Semenow, Assistant Military Attaché to the Russian Embassy at Tokyo, has been transferred to the Embassy at London, where he will serve for the next three years. Previously to his present appointment he was attached to a cavalry regiment at Warsaw. It is not yet known who will succeed Col. Semenow.

Mr. Y. Tahara, Commercial Attaché to the Japanese Embassy in London, has resigned his post.

Mr. Nakamura, the President of the South Manchurian Company, accompanied by Mr. Inusaka, the manager of the company, started early in December on a tour of inspection to Changchun and Kirin in Manchuria.

The death is announced of Mr. Kawasaki Shozo, the founder of the Kawasaki Dockyard, Kobe, Japan. He was 76 years of age and was recently promoted to the junior grade of the 5th Rank of Honour by the Emperor in recognition of services rendered to the State.

A despatch from Bangkok states that Dr. Tokichi Masao, Japanese legal adviser to the Siamese Government, was promoted to the rank of Prince on the occasion of the anniversary of the accession of the King of Siam on November 11. Dr. Masao was at the same time honored with the Second Order of the Siamese decoration awarded to the Princes of the Blood and was accorded special treatment due to members of the royal family. He is the first foreigner who has received such high honor from the Court of Siam. Dr. Masao comes from Iyo Province. In his early youth he went to Kobe and studied English in an English school. Later he went to America where he graduated from Yale University. He returned to Japan and obtained a degree of doctor of law by presenting a thesis. He was for a time on the staff of the *Japan Times*. In 1897 he went to Siam, being engaged by the Siamese Government as legal adviser, which post he still retains. Dr. Masao has contributed invaluable services to the work of diplomacy and legislation of Siam, especially in connection with the enacting of various codes, thus laying the foundation of the new legislation of the country.

Mr. Francis O'Conner, United States Vice-Consul, at Tamsui, has resigned. Mr. J. W. Valentine, United States Deputy Consul-General, has gone to Tamsui to act temporarily until the Consul, Mr. S. C. Reat, returns from his furlough.

It is officially announced that Senor Pacheco, Mexican Envoy Extraordinary and Minister Plenipotentiary to Japan, has been relieved of his post and will shortly return home. Mr. M. F. Rebolledo, the First Secretary of the Legation will be appointed Acting Minister.

The Electricity and Gas Departments of the South Manchuria Railway Company have been amalgamated with the Electricity and Gas Works, with Mr. Y. Tanuma as General Manager. Mr. H. Amemiya and Mr. T. Suzuki have been appointed Superintendents of the Electricity and Gas Departments respectively.

Mr. M. Numata, Director, who was Superintendent of the Electricity Department, has been released from his post.

Mr. A. A. Penney, one of the oldest foreign residents of Dairen left that port for good on December 12. For the last three years he had been connected with Messrs. Samuel & Company. He severed his connection with the firm at the end of November.

As the result of the recent election of the Auditors of the South Manchurian Railway Company on the expiry of the term of office, the following gentlemen were elected:—Mr. T. Nakahashi (re-elected), Mr. K. Kawakami, (re-elected), Mr. K. Magoshi (re-elected), Mr. S. Iwashita (re-elected), Mr. S. Ohashi (newly elected). Mr. Ohashi, who is the proprietor of the "Hakubunkan," one of the largest publishing companies of Japan, has succeeded Mr. H. Taki, of Nagoya, who resigned.

Mr. S. Hiroi who has been manager of the Hongkong branch of the Osaka Shosen Kaisha has been transferred to the head office at Osaka to act as traffic manager of the coasting lines department. Mr. Zoku Kamiya has been appointed manager of the Hongkong branch in his place.

A Presidential Mandate has been issued promoting the following to the rank of field-marshal:—The Manchu General Yin Chang, Chang Kweiti, the veteran Chinese General; and Baron Feng Koo-chang, who was recently appointed Tutuh of Chihi.

Mr. Tan Jen-feng, Director-General of the Canton-Hankow Railway, has recommended that Mr. Cheng Ming-chao be appointed Director of the section between Wuchang and Yochow; Mr. Chen Yu-lung, Director of the section between Yungchow; and Mr. Jeme Tien-yu, Director of the last section between Yungchow and Canton. It is reported that the Minister has complied with the request and that the appointments have been made accordingly.

Field Marshal Huang Hsin, of revolution fame, is stated to have accepted the post of Director-General of the Canton-Hankow Railway.

Mr. Hyoji Futakame, Acting Consul-General at Vladivostok, has been transferred to Moscow, and Consul Motonobu Nomura has been ordered to take his place at Vladivostok.

Messrs. Murao, Hida, Yamanishi and Hatakeyama, experts and officials of the Department of Communications, have been ordered to Great Britain, the United States and Germany with instructions to investigate works connected with electricity and post-office business for a term of one year.

Baron Hayashi, Ambassador to Italy, will be transferred to Austria, the present Minister being placed on the list of diplomats expectant, and Baron Ijuin, Minister to China, will be promoted to the post of Ambassador to Austria, being succeeded by Mr. Yamaza, Councillor of the Gaimusho, who is on a tour of inspection through China.

Mr. Chuji Kajiwara, formerly Chief of the Osaka Branch of the Bank of Japan, who was made Superintendent of the London branch of the Bank has left for his new post.

Mr. Frank Dundore Arnold, the new Third Secretary of the American Embassy, has arrived in Tokyo.

It is reported that Herr Ballin, the managing director of the Hamburg-Amerika Linie, is to make a visit to the Far East early next year.

Mr. F. Hanny, Chancellor of the Austro-Hungarian Embassy, has retired from service and will not go to Japan.

The appointment of Mr. Hans Karl Chamalman as honorary Vice-Consul for Japan resident in Vienna has been announced.

Baron Othon de Biegeleben, First Secretary of the Austro-Hungarian Embassy in Tokyo, has been ordered to another post which is not yet officially announced.

King George has approved the appointment of Sir William Conynham Greene, K.C.B., to be his Majesty's Ambassador Extraordinary and Plenipotentiary at Tokyo in succession to Sir Claude MacDonald, G.C.M.G., G.C.V.O., K.C.B.

Captain Hubert Brand, the new Naval Attaché of the British Embassy in Tokyo, arrived by the P.M. S.S. *Siberia* just in time for the Naval Review.

Mr. George H. Murray has been appointed American Consul-General-at-large in the Far East, in succession to Mr. F. D. Cheshire, who held the office from July 1906 until the date of his recent appointment as Consul-General at Canton.

Sun Wu (the man credited with starting the revolution at Wuchang) is said to have been appointed by the Central Government as the Director General of the Hanyehping Coal Mine Company.

Tsang Tien-yu, the Chinese chief engineer of the Canton-Hankow Railway, will proceed to Hunan for another survey of the railway line and for consultation on railway problems.

Mons. de Saint Pierre, manager of the Peking Branch of the Banque de L'Indo-China, in succession to Mons. Casenave, was expected in Peking early in December.

The *Sinwanpao* reports that Mr. A. W. U. Pope, General Manager of the Shanghai-Nanking railway, has been recommended to President Yuan Shih-kai for a decoration in recognition of his services to the Republic of China.

Mr. Pope left in the middle of December for a visit to Japan, and during his absence Mr. E. R. Morriss was appointed to officiate as General Manager, and Mr. J. D. Read as Traffic Manager.

Mr. William Schwanhauser, Chief Engineer of the International Steam Pump Company, has returned to America from a three months trip to Europe, visiting England, Germany and Russia.

While in London he closed a contract with S. Pierson & Son for the entire pumping equipment required for a new oil pipe line now under construction in Mexico. The pumping engines will be furnished by the Fred M. Prescott Steam Pump Company of Milwaukee, Wis., and the condensers and auxiliaries by Henry R. Worthington.

Mr. J. F. Oiesen, the Commissioner of Customs at Tientsin, has been offered an important post in connection with the Salt Gabelle management and collection, at the wish of the Financial representatives there of the Six Power group.

INSURANCE

Fire Insurance Business in Japan.—According to the latest returns published by the Japanese Department of Agriculture and Commerce there are at present twenty-two fire insurance companies, five marine insurance companies, seven transit insurance, one credit insurance company and one engine and steam boiler insurance company. The capital of these companies is:

Fire Insurance	Y. 41,000,000	(11,052,537 called)
Marine Insurance	10,050,000	(3,900,000 called)
Transit „	32,000,000	(8,300,000 called)
Credit „	5,000,000	(1,250,000 called)
Engine boiler Insurance ..	500,000	(125,000 called)

The premiums these companies get during one year is:

Fire Insurance	Y. 8,783,687
Marine Insurance	6,622,422
Transit „	149,724
Credit „	20,711
Engine „	27,000

TRAMWAYS

SHANGHAI TRAMWAYS

The returns of the Shanghai Tramways (Foreign Settlement) for the week ended November 27 are as under:—

	1912.	1911.
Effective receipts after deducting loss by exchange)	$16,070.65	$13,826.52
Passengers carried	817,549	667,049
Car miles run	53,565	50,195

The loss by exchange of subsidiary coinage for the week was equal to 23.04 per cent. of the gross cash collected on the cars as compared with 24.12 per cent. for the corresponding week last year.

For the week ended December 4:—

	1912.	1911
Effective receipts (after deducting loss by exchange)	$15,814.64	$14,206.83
Passengers carried	803,197	690,978
Car miles run	52,904	49,804

The loss by exchange of subsidiary coinage for the week was equal to 23.04 per cent. of the gross cash collected on the cars as compared with 24.45 per cent. for the corresponding week last year.

For the week ended December 11:—

	1912.	1911.
Effective receipts (after deducting loss by exchange)	$15,900.69	$13,380.37
Passengers carried	805,846	648,711
Car miles run	52,635	48,470

The loss by exchange of subsidiary coinage for the week was equal to 22.82% of the gross cash collected on the cars as compared with 24.33% for the corresponding week last year.

For the week ended December 18:—

	1912.	1911.
Effective receipts (after deducting loss by exchange)	$14,610.10	$14,947.37
Passengers carried	737,247	729,446
Car miles run	50,878	50,885

The loss by exchange of subsidiary coinage for the week was equal to 22.91% of the gross cash collected on the cars as compared with 24.18% for the corresponding week last year.

Nagasaki Tramway Scheme.—The Nagasaki Electric Tramway Company scheme is making progress, but very slowly. It is now reported that Mr. Masuda, of Kobe, who is the principal promoter, will go to Nagasaki shortly, having made satisfactory arrangements for the flotation of the Company. The capital required is Yen 1,200,000; the working expenditure is estimated at Yen 42,756 and the receipts--a difficult matter to forecast—at Yen 207,360, enabling a dividend of eleven per annum to be made. Power will be obtained from the Electric Lighting Company.

Manila Street Railway.—The Governor-General has approved the plans for extension of the street railway through the port area district. The manager of the company, Mr. Stone, suggested that the part of the extended franchise covering the streets from Pier 5 to the intersection of Second street and Muelle Tacoma should be temporarily approved, in order that the line might be extended down the water front, to accommodate the employes of the Earnshaw slip, the I. P. A. employes, the employes of Engineer island, and the quartermaster's department. This was done, and the railroad company is now at work extending the tracks.

Yokohama Tramways.—The City of Yokohama will soon have two electric tramway companies. The Yokohama Electric Tramway Company is now pushing its extensions in Yokohama, and has already eight miles of lines in the city. Another company, which has already received a charter from the Yokohana Municipal authorities, will commence work early next year in Yokohama. It has already begun operations in Meguro, whence the line runs to Yokohama via Hodogaya. The main station in Yokohama will be built at Takashima-cho, whence the lines will extend to Tobe, Theatre street, and the Bund, where the shore along the foot of the Bluff as far as Negishi and Honmoku will be reclaimed. The establishment of the two companies in Yokohama will naturally result in keen competition.

Some time ago, the Yokohama city authorities approached the Yokohama Electric Tramway Company, and requested it to pay a certain percentage of their gross receipts into the Yokohama city office as taxes. Owing to the failure of these negotiations, it is reported that the Yokohama City authorities will impose a tax of two yen on each electric pole, and twenty sen on each six feet of rail. The amount estimated in receipts is 5,753 yen.

Tientsin Tramways.—The *China Critic* (Tientsin) is informed that a group of Japanese Financiers have been endeavouring to buy the Tientsin City Electric Tramway's Co. Ld., which was under offer to them; but the price asked appeared to them too high, so the deal was 'called off,' for the present. Other negotiations are, however, likely to ensue.

Bangkok Tramways.—Mr. H. Sels, the Belgian tramway expert who visited Bangkok in October, on behalf of a syndicate which is considering the acquirement of a controlling interest in the Siam Electricity Co., strongly insists upon the necessity of putting down a double tramway track, at least upon the Bangkolem line. With a single track, he says, it is not possible to maintain a fair service upon so extensively used a line. The Government is working hard for the improvement of Bangkok and Siam generally, and already, aided by the aptitude of the Siamese people to learn new things, they have had much success. But time is money, and in order to make more money it is necessary for the people to have a continuous tramway service, and not one with a wait at every siding. It would be a good thing for the Siamese Government to order the Electricity Company to put a double track down.

Shanghai Chinese Tramways.—In January, it is expected, work will begin for the laying of tramways along the Chinese Bund at Shanghai. Part of the material has already arrived, and work on the car-sheds, which are stationed near the station of the Shanghai-Hangchow Railway, is now being undertaken by the *concessionaries* themselves, the "Compagnie Chinoise de Tramways." The track will run along the Chinese Bund, from its junction with the French Concession, practically as far as the Arsenal and the railway station, the line being single with frequent loops. Power is to be supplied from the electric works at present at Nantao, where the plant has been augmented. Messrs. Siemens have the contract.

Seoul (Korea) Tramways.—A Seoul report says that the Governor-General has announced a plan of street improvements for the peninsular capital. Nineteen streets are to be changed turning them into thoroughfares of varying width from 48 to 180 feet, at a total outlay of 13,000,000 yen. The scheme will be put into practice commencing next year as a work that will take some time to complete. The streets involved being all situated north of Kogane-machi, which is mostly inhabited by Koreans, the center of commerce where the Japanese have hitherto been concentrating their attention, will gradually be removed. Shrewd men of business are said to be already trying to buy up the land where street improvements will be introduced.

Hongkong Tramway Company.—The Hongkong Tramway Company announced that an interim dividend at the rate of 5% per annum free of Income Tax for the six months ended 30th June, 1912, would be paid on and after the 23rd November, 1912, to all Shareholders on the register on the 16th November.

COMPANIES

Crown Hardwood Company.—This company, which is capitalized at $1,000,000, U.S. currency, has been organized, and authority to engage in business in the Philippine Islands was granted on November 13 to the incorporation. Capitalists from the United States and British Columbia are financing the concern. The concession was granted over two months ago and a modern lumbering enterprise of the first magnitude with logging equipment, railway, saw mills and planing machinery of the most efficient and up-to-date type will be installed at once.

The concession, which embraces an area of 455 square miles, is located on the Ragay Gulf, near Guinayangan, and principal promoters and incorporators are J. H. Kern, A. J. McEchran and E. J. Lane, of Manila.

This immense forest tract was advertised for competitive bids several months ago, and the award was finally made to E. J. Lane, who has associated with him several wealthy timber operators, from the Northwest. Among the principal timber species which will be cut are yacal, guijo, apitong, lauan and tanguile. A minimum of seven miles of railway will be installed at once, equipped with 20 sets of standard gauge logging trucks and the necessary logging locomotives.

Within one year a sawmill with a capacity of at least 50,000 board feet will be in operation and within 18 months this capacity must be increased to a daily capacity of 100,000 board feet. The concessionaire is bound to invest within 18 months the sum of P. 200,000 in providing tugs, lighters, barges and other equipment for water transportation.

Dairen Fertilizer Manufacturing Co.—The Dairen Fertilizer Manufacturing Co. has completed the construction of the plant and installation of machinery. The housing accommodation for its employees is nearing completion. The management hoped to celebrate the completion of the plant early in December.

Hokkaido Colliery & S. S. Co.—The Hokkaido Colliery and Steamship Company held a special meeting on November 29. The Mitsui company sent the following proposal to the meeting; that 10 yen be paid on the new shares and when this is paid to make one share out of two, to reduce the capital to 13,500,000 yen, and no dividend for five years after the adjustment. Then to issue fresh preferential stocks of 6,500,000 yen with interest of seven per cent. The second proposal is; let 10 yen be paid on the new shares and if a good opportunity presents to make two shares into one, reduce the capital by half and pay no dividend for seven years; issue new preferential shares of 6,500,000 yen with interest of eight per cent. The committee discussed the two proposals but no decision was given as the members were divided in their opinions.

Japanese Gas Companies.—Various gas companies which are connected with the Japan Gas Company have all obtained more or less satisfactory results. The companies which have already wound up accounts are as follows:

	Net Profit.	Dividend %
Kagoshima	7,599,818	9
Kumamoto	8,006,533	10
Omuda	2,442,735	6
Kure	10,481,535	6
Nakagawa	3,445,218	5
Himeji	4,290,289	6
Niigata	3,901,025	6
Shimonoseki	11,435,545	12
Chiba	1,544,135	—
Hakata		9

The Japan Gas Company held its general meeting on December 18th and adopted the following accounts.

Net profits	35,664
Brought from the previous term... ...	17,285
Legal reserve	1,800
Bonus to officials	3,500
Reserve for pensions to retired officials	1,000
Dividend (7 per cent.)	28,000
Carried next term	18,650

Naigai Men Kaisha.—The Naigai Men Kaisha (Domestic and Foreign Cotton Company) of Osaka, Japan, has decided to double its present capital of 2,500,000 *yen*, and as a preliminary measure, has called for the payment of the last instalment on its old shares. The shareholders remaining registered on December 1, were to be entitled to new shares of the same number as their old shares.

Burma Oil Company.—The Burma Oil Company has declared an interim dividend on the first preference shares of £1 each at the rate of 7 1-5 pence per share under deduction of income tax: on the second preference shares of £10 each at the rate of six shillings per share; and on the ordinary shares at the rate of one shilling per share free of income tax.

Yokahama Electric Light Company.—A general meeting of the Yokohama Electric Light Company was to be held on December 21 at 1 p.m. when a dividend of 11 per cent. was to be declared. The gross receipts of the present year are Yen 376,630, of which 19,415 will be carried over to the following year.

ROADS AND BRIDGES

Laoag River Bridge. — The Bureau of Public Works, Manila, has under contemplation the construction of a bridge over the Laoag River, in Ilocos Norte, Philippine Islands. Sealed proposals for the construction of the sub-structure of this proposed bridge were received and opened on November 13 at the Bureau of Public Works. The bridge when completed will consist of seven 160 foot spans, the piers and abutments to be of concrete and the superstructure of steel, the roadway being sixteen feet in width.

The bids received have been taken under advisement, and were as follows: Atlantic, Gulf and Pacific Company, P. 68,670: A. F. Allen P. 64,390: Daniel Galza, P. 63,000.

Candon Bridge.—Only one bid was received for furnishing material for the Candon bridge at Ilocos Sur. The bid was made by the Atlantic, Gulf and Pacific Company, which offered to furnish all fabricated steel and field revets for one 49.34 meter Pratt truss span and miscellaneous fabricated materials for 18.8 centavos per kilo. The bridge in which the material is to be used is located on the Candon river on the Vigan-South boundary road.

MINING

Fushun Collieries.—It is stated that, as the daily outport of the Fushun Colliery is increasing, almost beyond the demand for ordinary and shipping purposes, the management has decided to erect a plant at Chienchinchai (colliery town) for the manufacture of sulphate of ammonia, and the extensive utilisation of Producer Gas: for both of which there is a large demand in Japan at profitable rates. It is stated that 100 tons of Fushun Coal produce 5 tons of sulphate, in addition to a large quantity of Producer Gas.

A new market has been found for Fushun coal in the Philippines, the Manila agency of the Mitsui Bussan having just completed a contract. In addition to its regular markets at Shanghai and Hongkong, the prospects of the export of Fushun coal to the Straits settlement are now very bright. Much difficulty is being encountered, however, in chartering vessels owing to the demands of the bean trade.

Gold Mine in Shantung.—During the late regime the gold mine of Shaoan Shan in the Prefecture of Chih Chou, Shantung, was operated exclusively under official control, and proved a losing concern. Mr. Liu Shenchou, one of the gentry of the Prefecture, has petitioned the Shantung Provincial Government to permit him to start operations on the mine on his own resources, as he is confident of its success if worked as a private enterprise. The Tutuh has telegraphically represented the case to the Ministry of Industry and Commerce and is awaiting for instructions.

East Batan Coal Mine.—The property of the East Batan Coal Mining Company was sold by auction at Manila on November 20, and was bought by the Government for Pesos 21,000.

Mineral Production in Japan.—The Japanese Department of Agriculture and Commerce gives the following figures relative to the production of minerals for September and nine months of the year:—

	September	Since Jan.	Compared with 9 months 1911.
Gold momme..	114,236	871,540	+68,786
Silver momme	3,407,123	28,740,112	+2,470,968
Copper kin.....	7,090,345	66,576,640	+7,208,629
Iron kan.......	1,563,696	12,425,104	+512,681
Coal ton.......	1,334,791	12,416,006	+1,247,222
Petreleum koku	116,886	1,011,067	−80,700
Sulphur kin....	7,316,603	59,590,940	+5,106,882

Momme—.1325 ounces, Kin—lb., kan 8.28 lb.,

koku—4.9629 bushels

According to the returns published by the Japanese Department of Agriculture and Commerce the total amount of the mineral output during 1911 was *Yen* 106,071,014 in value, which is an increase of *Yen* 5,817,438 over 1910. The comparison between the output for 1911 and that for 1910 is as follows:

	1911	Comparison with 1910
Gold	6,059,497	87,691 (inc.)
Silver.. ..	4,761,952	134,536 (dec.)
Copper ..	27,119,917	1,300,648 (inc.)
Iron	2,575,514	220,159 (dec.)
Coal	55,006,501	3,930,103 (inc.)
Petroleum..	6,888,552	8,081 (inc.)
Sulphur ..	1,271,672	223,908 (inc.)

Waichow Mines.—General Lung Chai Kwang having previously invited the co-operation of Chinese merchants for opening up the mines in the district of Waichow, Kwangtung, it is now reported that his project will soon be launched. General Lung recently visited Hongkong to deliberate with the merchants there on the steps to be taken.

New Gold Mine at Sado.—The output from the Aikanea gold mine in Sado has recently been reduced and its value in future had begun to be doubted. However, the mining department of the Mitsubishi Co., has discovered a new mining area which produces excellent gold and is very rich in the mineral. The new area is situated at the side of the Nyugawa at Takachimura, six *ri* distant from the Aikawa main mine. The only defect is that it lacks facilities of land and water communications. The proportion of gold contained in the area is 4—100,000ths, and silver 3—10,000ths. By this discovery the Aikawa mining business, which was gradually declining will be restored more or less to its former prosperity.

Mining Industries in Fukien.—A number of wealthy merchants who have returned from abroad are taking an active interest in the mining industries in Fukien. Investigation parties have been organized to travel through the province in search of the whereabouts and kinds of mineral mines, and steps have been taken to organize a large mining corporation with sufficient capital to make it a success, says the *Peking Daily News*. The mines at Chenho, the tin mines at Hsiyanytao, and the iron mines in Lungpenchow will be operated as soon as the Fukien Government has given its sanction and the necessary arrangements can be made.

Gold in Federated Malay States.—The quantity of gold exported from the Federated Malay States in October was 1,022 ounces, making the total exported for the ten months of 1912, 10,077 ounces.

Model Mining Operations in China.—During the late Ching Dynasty, the Taotais of Industries in the provinces were under instructions to submit mining charts to the Central Government for reference. The Chief of the Mining Department in the present Ministry of Industry and Commerce is strongly in favour of the practice, and has been making plans to divide the country into several mining districts over which special directors will be appointed. One of the important duties of the directors will be to operate a model mine with most up-to-date machinery, so that the people may learn the scientific methods of mining, and the much needed training may be thus procured.

Shantung Mining Company.—At the general meeting of the Shantung Mining Company, Limited, in Berlin, the shareholders resolved to make an offer to the Shantung Railway Company for the cession of their enterprise in one block against new shares of the latter company to the nominal value of m.5,400,000, these shares participating in the profits from Jan. 1 next. It is generally expected that the railway company will avail itself of this offer, and, in order to effect the proposed payment, will increase its share capital from m.54,000,000 to m.60,000,000. The chairman declared that m.6,000,000 to m.7,000,000 would be necessary to write down the plants to their real value. The first six months of the current year had given a profit of m.424,000, but it would be impossible to extinguish the existing loss of m.1,237,111, and to reduce the debts. The iron ore mines can only be exploited by the railway company in a remunerative manner. Telegrams received in Shanghai during November stated that the offer had been accepted.

The total value of steamers imported into or built in Japan during 1912 shows an increase of over Y.5,000,000 or 40 per cent. over the corresponding period of last year.

Manila is to have a new theatre, which is to be erected at a cost of about P. 200,000.

IRON AND STEEL WORKS

The Hokkaido Tanko.—The Committee appointed to investigate the affairs of the Hokkaido Tanko iron foundry seems inclined to break away from the arrangement with the Muroran Steel Works, which at present is the chief source of loss to the colliery company especially in view of the fact that there is no written agreement. The capital already sunk in the foundry scheme exceeds yen 1,000,000, and another million is required before satisfactory results can be expected. The foundry is closed down for the present, and yet 1,500 yen a month is being spent in its upkeep. The foundry was built specially to supply material to the Steel Works. The fact that the Tanko would have been a prosperous concern to-day if it had attended exclusively its business of coal mining is weighing very heavily on the Committee and it is believed to strongly favor any sacrifice in preference to continuing the foundry work.

Iron Foundry in Manchuria.—According to the *Asahi*, one of three smelting furnaces to be erected at the Pengchihu iron foundry in Manchuria near Liaoyang, which has been started by Messrs. Okura & Co., Tokyo, has been completed and the manufacture of pig iron is to be started shortly. The materials for the construction of the smelting furnace have been supplied by the Imperial Iron Foundry at Wakamatsu, and all the pig iron produced at the iron foundry in Manchuria is to be delivered to the Wakamatsu foundry. When the Pengchihu foundry is completed, the the annual output of pig iron is estimated at 120,000 tons, representing Y. 4,800,000, in value.

Tsingtau Iron Works.—It is reported that the Germans at Tsingtau intend to open iron works in which Chinese capital will be allowed to participate. It is proposed to start upon a a large scale, with a capitel of ten million dollars, to work the iron coming from Chinlingchen, which is near the Shantung Railway.

HARBOURS WATERWAYS AND WHARVES

New Pier at Dairen.—The new pier at East End at the east of East Quay, Dairen Wharves, intended for the discharging of inflammable goods will be completed in September, 1913. This pier will be built of steel trusses in the fore part where ships are to be berthed in 28 feet of water, the remainder being constructed mostly of stone. When completed, this pier will be 1,750 feet long, and will obviate the clumsy task of discharging oil by lighters, since any steamer bringing oil, say, for the Standard Oil Co. will be able to pump her cargo into the piping which connects with the tanks at the Company's Oil Depot.

The Tungting Lake.--A Hankow dispatch of November 21 states that the Governor-General of Honan has proposed to start the dredging of Tungting lake, as the sand at the bottom of that lake often causes floods in neighboring regions. Vice-President Li Yuanhung has approved the proposed scheme.

BUILDING

Reconstruction of Hankow.—The members of the Provincial Assembly at Wuchang have held a conference to discuss the articles of the Dollar loan contract and the proposal made by a representative of the Chinese settlers abroad that lands in Hankow be purchased and houses rebuilt with their capital. The amount of the chief engineer's salary and the other expenditures in the Hankow Reconstruction office have also been fixed.

WATER SUPPLY AND IRRIGATION

Irrigation in Iloilo.—The installation of the Santa Barbara irrigation system in the province of Iloilo, to cost when completed P.760,000, has been authorized and an allotment of P.250,000 made available for immediate use. The system will accommodate an area of 4,000 hectares of cultivated land and double its producing capacity at a cost per hectare per annum of P.4.60. The construction will include 106.6 kilometers of main canals, main distributing canals, laterals, structures to bring the water from the Santa Barbara River at a point one and one-half kilometers below the Philippine Railway Bridge for the irrigating of 4,000 hectares in the municipalities of Santa Barbara, Jaro and Leganes.

Swatow Waterworks.—In connection with the new Swatow waterworks scheme now in progress, several matters have been giving trouble lately. It appears that considerable difficulty is being experienced in finding a satisfactory foundation for the large cofferdam now in course of construction. The ground in the locality is of soft mud running to a great depth, and although the engineering difficulty is not insurmountable, the cost will run to a good deal more than was at first calculated. Small property owners, too, are obstructing progress along the pipe line by demanding a considerable higher figure for the ground than it is worth, or than the company feel inclined to pay.

FINANCIAL

China Deposits in German Banks.—It is reported that Chinese deposits in the German bank at Tsingtau amount to over 17 million dollars, while Chinese deposits in other foreign banks at Hongkong, Shanghai, Tientsin, Peking amount to several hundred million of dollars.

Hupeh Loan.—It is reported that the Hupeh Government has concluded an agreement with a certain American Bank for a loan of Tls. 16,000,000 with interest at the rate of six per cent. per annum, Tls. 5,000,000 will be appropriated for the repayment of other loans, and the payment of Boxer Indemnity; Tls. 5,000,000 for the military administration; Tls. 6,000,000 for industrial enterprises.

Chinese Domestic Loan.—The central Government in Peking is reported to have decided to issue domestic loan bonds to the amount of Tls. 100,000,000 with interest at the rate of eight per cent. on the security of the national taxes. The repayment of these loan bonds will commence in the second year and will be completed within six years.

Bank of Formosa.—At the last half-yearly meeting of the Taiwan Ginko (Bank of Formosa) a dividend at the rate of 10 per cent. per annum was declared. The amount of gross profits for the half year ended 30th June last was Yen 3,122,088, and the balance brought forward from last account Yen 210,424. The net profit for the half-year amounted to Yen 513,391, and Yen 219,316 was carried forward to the next account, after allowing for the payment of dividend, bonus to employees, etc.

The subscribed capital of the bank is Yen 10,000,000, and the Reserve Fund 2,940,000, including Yen 170,000 added from the profits of the past half-year. The notes of the bank in circulation total Yen 20,017,376 current and and other accounts stand at Yen 38,307,682: and Bills Payable, etc., Yen 3,811,479. Among the assets are the following sums: Loans to Government Yen 5,005,590: Bills discounted, Loans, etc., Yen 45,576,505: Government Bonds Yen 6,739,242: Bullion and foreign money Yen 4,305,579; and capital uncalled Yen 3,750.00.

The Franco-Japanese Bank.—The Japanese branch of this Bank was registered by the Department of Finance at Tokyo on November 12.

The Advisers to the Bank, Baron Shibusawa, Messrs. Hayakawa, Mimura, and Mishima and Directors Dr. Soeda, Messrs. Watanabe and Murata met on November 21 in connection with the business of the Bank. It was decided that the Tokyo Branch of the Bank can independently engage in business without being under the control of the Industrial Bank of Japan and that the Japanese shareholders of the Bank be treated as a banking corporation. It is understood that this decision was wired to Paris for sanction.

Sino-Belge Bank.—The Sino-Belge Bank, held a general meeting at Brussels on November 20, Baron Baeyens presiding. The balance sheet to June 30, 1912, shows a profit of 1,188,687f., which represents a marked improvement on the previous financial year. The dividend has therefore been increased to 5 per cent. The profit has been distributed as follows:—

	Francs.
Depreciation fund for Peking and Cairo branches	33,616.01
Various depreciation accounts ..	65,000.00
	98,616.01
Legal reserve	47,900.55
Special reserve	150,000.00
Provision for license	10,000.00
Statutory allocations..	93,138.75
Five per cent. dividend	750,000.00
Carried forward	39,031.98
	1,188,687.29

The official report, which was approved, contains an interesting paragraph concerning the commercial development of China. It is said that the Republican régime will be greatly beneficial to the country and that reforms will be carried out which will stimulate the regular development of natural resources, together with the productive power of its huge population.

The first task is the reorganisation of the finance of the country. The Government will have to raise loans abroad to arrive at that end. The Sino-Belge Bank has taken part in previous financial operations, and the Peking branch, formed during the present financial year, is rendering excellent services.

The local troubles have more or less paralysed commercial exports and imports. Many Chinese banks remain closed, and the capital has increased the cash holdings of foreign banks. When the situation becomes normal commercial transactions will not fail to resume a corresponding improvement.

The reports adds that during the last financial year a branch has been established at Cairo, and its activity fulfils the hopes of the board.

PUBLIC WORKS

Shaokangtzu Drainage System:—The construction of a drainage system in Shaokangtzu (Chinese Quarter of Dairen) was put in hand early last June, and about 30% of the work has already been finished. This system will be 39,000 feet in total length, when all is completed about May next year, and will cost about Y.83,000. The authorities are planning to supplement this system with gutters to be constructed along both sides of the streets at an outlay of about Y.50,-60,000.

Federated Malay States.—The total number of miles of metalled cart roads in the States of Perak, Selangor, Negri Sembilan, and Pahang at the close of 1911 amounted to 1,987 miles; of unmetalled cart roads, 233 miles; and of bridle roads and paths, 1,542 miles. This shows a substantial increase on the mileage in 1910, and it will be still further increased during the current year. In Pahang alone there is a stretch of 149 miles under construction, while in Perak and Selangor additions would have been greater in 1911 had it not been for abnormally wet weather.

LIGHT AND POWER COMPANIES

Malacca Electric Co.—At the statutory meeting of the Malacca Electric Company at Singapore, Mr. C. E. F. Sanderson said the flotation was very successful and good progress in construction was being made. It was hoped to be in a position to supply current in November, although the work might be delayed by the dock strikes in England. They had made an agreement to supply the New Club, Malacca, with current for three years, and it was almost certain the company would be required by the municipality to undertake street lighting. They had every reason to anticipate that as soon as the supply commenced a good demand for current, would be experienced.

Electricity Works at Tientsin.—It is stated that the General Electric Company of China, Limited, has secured an important contract, against severe competition for the electric lighting plant for the Japanese Electricity Works Extension in Tientsin. The plant will consist of two Belliss and Morcom engines direct coupled to Witton continuous current generators, which are manufactured by the General Electric Co., Ltd., works in Birmingham.

GENERAL NEWS

Foreign Industries in China.—The Japanese *Official Gazette* of November 29 published the text of the treaty signed between Japan and Russia at Tokyo on June 23rd last, which will go into effect in the spring of 1913. The treaty is designed for the mutual protection and enforcement of the powers of ownership over the industries of the high contracting parties and their nationals in China.

Chinese Engineering Association.—The rules for an Engineering Assocation, whose object is the study and discussion of works and projects in China has been, it is stated, drafted out by a prominent engineer in Kwangtung and submitted to the Tutuh at Canton for approval.

Brazilian Colonization Company.—Under the auspices of Barons Shibusawa and Kondo and Mr. Nakano, President of the Tokyo Chamber of Commerce, a conference was held recently at the Tokyo Chamber of Commerce building, with regard to the proposed Brazilian Colonization Company, which is to be organized for taking over the special privileges from the Tokyo Syndicate for obtaining uncultivated lands in Brazil, which the Brazilian Republic offers. A great number of capitalists in Tokyo and Yokohama were present to consider the scheme.

Great Britain and Japan—By an exchange of diplomatic notes which took place between the British Ambassador and the Japanese Minister for Foreign Affairs on the 31st of October, it was notified on November 4 in the Japanese *Official Gazette*, that the fees charged for the endorsement of the place of production of goods intended for export from Japan to Britain and *vice versa* would be abolished on and after the 1st of January next.

Hongkong Dredger.—It is understood that the Kowloon Dock Co.'s dredger "Canton River" has been sold to the New South Wales Government. She was to leave sometime in December and goes down under her own steam in charge of Capt. Weare of the Dock Company.

Silk in Japan.—The Japanese Department of Agriculture and Commerce has published a statistical report on the export of Japanese silk, according to which this is a record year since silk began to be exported from Japan. The figures as they stood at the end of October every year since 1906 are as follows:—

	Yen
1906	87,066,284
1907	106,257,454
1908	89,303,186
1909	103,679,714
1910	109,007,975
1911	111,762,863
1912	117,281,000

Japan - Austro - Hungarian Commercial Treaty.—The new treaty of commerce between Japan and Austria-Hungary has been signed at Vienna by the plenipotentiary representatives of the high contracting parties.

Chino-German Refinery.—It is reported that a German firm has contracted with the Chinese Ministry of Commerce and Industry to promote a Chino-German beet sugar refinery company for which the firm will supply machinery costing 600,000 Taels and also a working capital of 200,000 Taels, whilst China is to provide land in Manchuria of an equal value.

Insurance in Japan.—The conference of Japanese Insurance Companies is now feeling acutely the effect of the vigorous competition carried on by the foreign insurance companies doing business in Japan. The conference has a conventional rate of premium which is rigidly binding upon the members, who are, therefore, not at liberty to use their own discretion, even in exceptional cases. The Japanese companies are thus exposed at every step to the danger of breaking their own rules and penalizing themselves, for which reason the committee of the conference is now considering the relaxation of the existing rules within reasonable bounds.

NAVAL

New Japanese Cruiser.—The Japanes armored cruiser *Hiyei* was launched at the Yokosuka Naval Yard on November 21st at 2 p.m. the sea then being at high tide. The new cruiser is 23,500 tons and has a speed of 25 knots. The vessel will carry eight 14 inch guns and sixteen 6 inch guns.

SHIPPING COMPANIES

Kobe-Sourabaya-Line.—A charter was granted on November 11 to Messrs. Keizo Oaki, Jujiro Harada and Kankichi Itatani for opening a new steamship service between Kobe and Sourabaya, with Moji, Hongkong, Singapore, Batavia, and Samarang as regular ports of call. It is provided that the steamers of the line will regularly call at those ports on outward voyage, while on the return voyage they will directly sail for Kobe from Sourabaya calling only at Hongkong. On the outward voyage the liners may call at Keelung on their way from Moji to Hongkong. Further it is provided that the liners may extend their voyage to Yokohama from Kobe and to other ports in the Neitherland Indies from Sourabaya. The service will be monthly at present. The charter takes effect from November terminating in March, 1915.

Toyo Kisen Kaisha.—The *Nichi Nichi* is responsible for the statement that the Toyo Kisen Kaisha, urged by the general progress of the world's navigation and particularly in view of the approaching completion of the Panama Canal, has entered into negotiations with the Mitsubishi Dockyard for the construction of several ships of from 15,000 to 16,000 tons displacement. It is not decided yet whether the money required for their construction shall be raised by a loan or by making calls on its shares.

China Merchants S. N. Co.—The China Merchants Steam Navigation Company has demanded that the Government pay the company Tls. 500,000 for the passages of disbanded soldiers. Presidents Yuan intends to issue to the company domestic loan bonds to that amount.

Compania Cooperativa de Negros.—This company was recently organized with a capital of Pesos 200,000 for the purpose of improving transportation facilities between Negros and Iloilo. One steamer soon, and latter several others, will be placed on the run between Iloilo and the principal ports of Negros, and a first class passenger service maintained.

Nippon Yusen Kaisha.—The Nippon Yusen Kaisha has succeeded in purchasing from an English dockyard a steamer of ten thousand tons displacement, a sister ship to the one reported to have been recently purchased by the Company to arrive in Japan in May next. The new steamer is expected in Japan in October next.

The half-yearly meeting of the N. Y. K. was held at the Tokyo Chamber of Commerce on November 28, the President, Baron Kondo, presiding, Baron Kondo mentioned that the competition on the Calcutta run had caused freights to drop from yen 9 to yen 2.50 per ton. This competition was, of course, carried on at great loss, but it would be prosecuted until the object of the company was attained. One result of the competition was a greatly increased Japanese-Indian trade. As several of the company's steamers would cease to earn a subsidy very soon, eight new steamers were now under construction. The estimated expenditure on these was 15,000,000, which would be wholly disbursed by 1915. To meet this expenditure the company would not require to increase its capital or issue debentures.

The payment of a dividend at the rate of 10 per cent. per annum was approved, and the directors and other leading officials of the company were re-elected. It was decided to establish branches at Tokyo (near the harbour), Osaka, and Keelung. The proposal was finally approved to present the sum of yen 300,000 to the former directors of the company. Following is a statement of the account:

	Yen.
Brought forward.................	882,944.43
Gross Profit	2,803,067.87
Total.....................	3,686,012.30

	Yen.
To Reserve	140,153.39
To make good deficiency in subsidy receivable from Government under Navigation Encouragement Law..............	258,579.91
Fund for increase of vessels and extension of service............	1,300,000,00
Directors' fees	73,555.00
Dividend 10 per cent. per annum..	1,100,000.00
Carried forward	813,723.99

Nisshin Kisen Kaisha.—This company at its general meeting declared a dividend of 7 per cent. The company has realised a fair amount of profit due to the conclusion of an agreement among various companies in the Hankow-Shanghai line, which had been exposed to competition.

PROPOSALS FOR CEMENT

OFFICE OF THE BUREAU OF SUPPLY,
MANILA, P. I., December 5th, 1912

Sealed proposals in triplicate will be received at this Office up to 11 a.m., January 20th, 1913, when they will be opened in the presence of the attending bidders for furnishing and delivering of 42,000 Barrels of Cement.

Proper forms and specifications may be had on application to this Office.

R. M. SHEARER,
Acting Purchasing Agent.

The Government of the Philippine Islands on November 29, 1912, issued the following as Executive Order No. 82.—Executive Order Numbered Seventy-five, current series, is hereby amended to read as follows:—

"It is hereby ordered that all Portland cement that may hereafter be purchased by the Government of the Philippine Islands for use in construction work to be done by or for the Government shall conform in every respect to the specification for Portland cement adopted by the departmental conference at the meeting held at the Bureau of Standards, Washington, District of Columbia, on February thirteenth, nineteen hundred and twelve, and approved by the heads of the several Departments, and promulgated by the President of the United States, and known as the United States Government specification for Portland cement: Provided, however, That sections twenty-four, twenty-nine, thirty and thirty-two shall be modified by the Purchasing Agent to meet the local conditions of the climate by reason of the fact that it will be necessary to make tests at a somewhat higher temperature than twenty-one degrees centigrade (seventy degrees Fahrenheit)."

NEWTON W. GILBERT,
Acting Governor-General.

The Department of Public Instruction, Bureau of Supply, Office of the Purchasing Agent, issued the following notification on December 2, 1912:—

By virtue of the authority contained in Executive Order No. 82, Series 1912, Sections 24, 29, 30 and 32 of the United States Government Specification for Portland Cement are hereby amended by substituting 27° C. (80.6° F) for the temperatures given in those Sections.

R. M. SHEARER,
Acting Purchasing Agent.

U. S. GOVERNMENT SPECIFICATION

The United States Government Specification for Portland Cement is as follows:—

I. SPECIFICATION

Definition.

1. The cement shall be the product obtained by finely pulverizing clinker produced by calcining to incipient fusion, an intimate mixture of properly proportioned argillaceous and calcareous substances, with only such additions subsequent to calcining as may be necessary to control certain properties. Such additions shall not exceed 3 per cent. by weight, of the calcined product.

Composition.

2. In the finished cement, the following limits shall not be exceeded:—

	Per cent.
Loss on ignition for 15 minutes	4
Insoluble residue	1
Sulphuric anhydride (SO_3)	1.75
Magnesia (MgO)	4

Specific Gravity.

3. The specific gravity of the cement shall be not less than 3.10. Should the cement as received fall below this requirement, a second test may be made upon a sample heated for 30 minutes at a very dull red heat.

Fineness.

4. Ninety-two per cent. of the cement, by weight, shall pass through the No. 100 sieve, and 75 per cent. shall pass through the No. 200 sieve.

Soundness.

5. Pats of neat cement prepared and treated as hereinafter prescribed shall remain firm and hard and show no sign of distortion, checking, cracking, or disintegrating. If the cement fails to meet the prescribed steaming test, the cement may be rejected or the steaming test repeated after seven or more days at the option of the engineer.

Time of Setting.

6. The cement shall not acquire its initial set in less than 45 minutes and must have acquired its final set within 10 hours.

Tensile Strength.

7. Briquettes made of neat cement, after being kept in moist air for 24 hours and the rest of the time in water, shall develop tensile strength per square inch as follows:—

	Pounds.
After 7 days	500
After 28 days	600

8. Briquettes made up of 1 part cement and 3 parts standard Ottawa sand, by weight, shall develop tensile strength per square inch as follows:—

	Pounds.
After 7 days	200
After 28 days	275

9. The average of the tensile strengths developed at each age by the briquettes in any set made from one sample is to be considered the strength of the sample at that age, excluding any results that are manifestly faulty.

10. The average strength of the sand mortar briquettes at 28 days shall show an increase over the average strength at 7 days.

Brand.

11. Bids for furnishing cement or for doing work in which cement is to be used shall state the brand of cement proposed to be furnished and the mill at which made. The right is reserved to reject any cement which has not established itself as a highgrade Portland cement, and has not been made by the same mill for two years and given satisfaction is use for at least one year under climatic and other conditions at least equal in severity to those of the work proposed.

Packages.

12. The cement shall be delivered in sacks, barrels or other suitable packages (to be specified by the engineer), and shall be dry and free from lumps. Each package shall be plainly labeled with the name of the brand and of the manufacturer.

13. A sack of cement shall contain 94 pounds net. A barrel shall contain 376 pounds net. Any package that is short weight or broken or that contains damaged cement may be rejected or accepted as a fractional package, at the option of the engineer.

Inspection.

14. The cement shall be tested in accordance with the standard methods hereinafter prescribed. In general the cement will be inspected and tested after delivery, but partial or complete inspection at the mill may be called for in the specifications or contract. Tests may be made to determine the chemical composition, specific gravity, fineness, soundness, time of setting and tensile strength, and a cement may be rejected in case it fails to meet any of the specified requirements. An agent of the contractor may be present at the making of the tests or they may be repeated in his presence.

15. In case of the failure of any of the tests, and if the contractor so desire, the engineer may, if he deem it to the interest of the United States, have any or all of the tests made or repeated by the Bureau of Standards, United States Department of Commerce and Labor, in the manner hereinafter specified, all expenses of such tests to be paid by the contractor. All such tests shall be made on samples furnished by the engineer.

STANDARD METHODS OF TESTING

Sampling

16. The selection of the samples for testing will be left to the engineer. The number of packages sampled and the quantity to be taken from each package will depend on the importance of the work, the number of tests to be made, and the facilities for making them.

17. The samples should be so taken as to represent fairly the material, and where conditions permit, at least 1 barrel in every 50 should be sampled. Before tests are made samples shall be passed through a sieve having 20 meshes per linear inch to remove foreign material. Samples shall be tested separately for physical qualities, but for chemical analysis mixed samples may be used. Every sample should be tested for soundness, but the number of tests for other qualities will be left to the discretion of the engineer.

Chemical Analysis.

18. The method to be followed for the analysis of cement shall be that proposed by the Committee on Uniformity in the Analysis of Materials for the Portland Cement Industry, reported in the Journal of the Society for Chemical Industry, volume 21, page 12. 1902, and published in Engineering News, volume 50, page 60, 1903, and in the Engineering Record, volume 48, page 49, 1903.

19. The insoluble residue shall be determined on a 1-gram sample which is digested on the steam bath in hydrochloric acid of approximately 1.035 specific gravity until the cement is dissolved. The residue is filtered, washed with hot water, and the filter-paper contents digested on the steam bath in a 5 per cent. solution of sodium carbonate. The residue is then filtered, washed with hot water, then with hot hydrochloric acid, approximately of 1.035 specific gravity, and finally with hot water, then ignited and weighed. The quantity so obtained is the insoluble residue.

Determination of Specific Grovity.

20. The determination of specific gravity may be made with a standardized apparatus of Le Chatelier or other equally accurate form. Benzine (62°. Baumé naphtha), or kerosene free from water, should be used in making the determination. The cement should be allowed to pass slowly into the liquid of the volumenometer, taking care that the powder does not adhere to the sides of the graduated tube above the liquid and that the funnel through which it is introduced does not touch the liquid. The temperature of the liquid in the flask should not vary more than 1°F during the operation. To this end the flask should be immersed in water. The results of repeated tests should agree with 0.01.

21. If the specific gravity of the cement as received is less than 3.10, a redetermination may be made as follows:

Seventy grams of the cement is placed in a nickel or platinum crucible about 2 inches in diameter and heated for 30 minutes at a temperature between 410°C and 630°C. After the cement has cooled to atmospheric temperature the specific gravity shall be determined in the same manner as described above. The cement should be heated in a muffle or other suitable furnace, the temperaturs of which is to be maintained above the melting point of zinc (410°C) but below the melting point of antimony (620°C.). This maximum temperature can be recognized as a very dull red which is just discernible in the dark.

Determination of Fineness.

22. The No. 100 and No. 200 sieves shall conform to the standard sieve specifications of the Bureau of Standards, Department of Commerce and Labor.

23. The determination of fineness should be made on a 50-gram sample, which may be dried at a temperature of 100°C (212°F) prior to sifting. The coarsely screened sample should be weighed and placed on the No. 200 sieve, which, with the pan and cover attached should be held in one hand in a slightly inclined position and moved forward and backward in the plane of inclination, at the same time striking the side gently about 200 times per minute against the palm of the other hand on the upstroke. The operation is to be continuep until not more than 0.05 gram will pass through in one minute. The residue should be weighed, then placed on the No. 100 sieve, and the operation repeated. The sieves should be thoroughly dry and clean. Determination of fineness may be made by washing the cement through the sieve or by a mechanical sifting device which has been previously standardized with the results obtained by hand sifting on equivalent samples. In case of the failure of the cement to pass the fineness requirements by the washing method or the mechanical device, it shall be tested by hand.

Mixing Cement Pastes and Mortars.

24. The quantity of cement or cement and sand to be used in the paste or mortar should be expressed in grams and the quantity of water in cubic centimeters. The material should be weighed, placed upon a nonabsorbent surface, thoroughly mixed dry if sand be used, and a crater formed in the center, into which the proper percentage of clean water should be poured; the material on the outer edge should be turned into the crater by the aid of a trowel. As soon as the water has been absorbed, the operation should be completed by vigorously mixing with the hands for one minute and a half. During the operation of mixing, the hands should be protected by rubber gloves. The temperature of the room and the mixing water should be maintained as nearly as practicable at 27°C (80.6° F).

Determination of Normal Consistency.

25. The normal consistency for neat paste to be used in making briquettes and pats should be determined by the ball method, as follows:

26. A quantity of cement paste should be mixed in the manner above described under Mixing Cement Pastes and Mortars, and quickly formed into a ball above 2 inches in diameter. The ball should then be dropped upon a hard, smooth, and flat surface from a height of 2 feet. The paste is of normal consistency when the ball does not crack and does not flatten more than one-half of its original diameter.

27. Trial pastes should be made with varying percentages of water until the correct consistency is obtained.

28. The percentage of water to be used in mixing mortars for sand briquettes is given by the formula:

$$y-2/3\frac{P}{-n+1}+K$$

in which "Y" is the percentage of water required for the sand mortar, "P" is the percentage of water required for neat cement paste of normal consistency, "n" is the number of parts of sand to one of cement by weight, and "K" is a constant which for standard Ottawa sand has the value 6.5.

The percentage of water to be used for mortars containing 3 parts standard Ottawa sand, by weight, to 1 of cement is indicated in the following statement:

Percentage of water for neat cement paste	Percentage of water for 1 to 3 mortars of standard Ottawa sand
18	9.5
19	9.7
20	9.8
21	10.0
22	10.2
23	10.3
24	10.5
25	10.7
26	10.8
27	11.0
28	11.2
29	11.3

Determination of Soundness.

29. Pats of neat cement paste of normal consistency about 3 inches in diameter, one-half inch in thickness at the center, and tapering to a thin edge, should be kept in moist air for a period of 24 hours. One pat should then be kept in air and a second in water, at the ordinary temperature of the laboratory not to vary greatly from 27° C (80.6° F), and both observed at intervals for at least 28 days. A third pat should be exposed to steam at atmospheric pressure above boiling water for 5 hours.

Determination of Time of Setting

30. The time of setting should be determined by the standardized Gillmore needles, as follows: A pat of neat cement paste about 3 inches in diameter and one-half inch in thickness with flat top, mixed at normal consistency should be kept in moist air, at a temperature maintained as nearly as practicable at 27° C (80.6° F). The cement is considered to have acquired its initial set when the pat will bear, without appreciable indentation, a needle one-twelfth of an inch in diameter loaded to weigh one-fourth of a pound. The final set has been acquired when the pat will bear without appreciable indentation, a needle one twenty-fourth of an inch in diameter, loaded to weigh 1 pound. In making the test the needle should be held in a vertical position and applied lightly to the surface of the pat. The pats made for the soundness test may be used to determine the time of setting.

Tensile Tests.

31. Tensile tests should be made on an approved machine. The test pieces shall be briquettes of the form recommended by the Committee on Uniform Tests of Cement of the American Society of Civil Engineers, and illustrated in Circular 33 of the Bureau of Standards. The briquettes shall be made of paste or mortar of normal consistency. Immediately after mixing, the paste or mortar should be placed in the molds, pressed in firmly by the fingers and smoothed off with a trowel without mechanical ramming. The material should be heaped above the mold, and in smoothing oft, the trowel should be drawn over the mold in such a manner as to exert a moderate pressure on the material. The molds should be turned over and the operation of heaping and smoothing off repeated. Not less than three briquettes should be made and tested for each sample for each period of test. The neat tests are not considered so important as the sand tests. The briquettes should be broken as soon as they are removed from the water. The load should be applied at the rate of 600 pounds per minute.

Storage of Test Pieces.

32. During the first 24 hours after molding the test pieces should be kept in air sufficiently moist to prevent them from drying. After 24 hours in moist air the test pieces should be immersed in water. The air and water should be maintained as nearly as practicable at 27°C (80.6° F).

Standard Sand.

33. The sand to be used shall be natural sand from Ottawa, Ill., screened to pass a No. 20 sieve and retained on a No. 30 sieve.

34. Sand having passed the No. 20 sieve shall be considered standard when not more than 2 grams pass the No. 30 sieve after one minute continuous sifting of a 200-gram sample.

35. The No. 20 and No. 30 sieves shall conform to the Standard sieve specifications of the Bureau of Standards, Department of Commerce and Labor.

ALPHABETICAL LIST OF ADVERTISERS

Albany Lubricating Co. ... 69
Alhambra Cigar & Cigarette Factory ... 57
American Car & Foundry Co. ... 13
American Bank Note Co. ... 67
American Blower Co. ... 48
American Locomotive Co. ... 9
American Tool Works ... 5
American Trading Co. ... 42
Andersen, Meyer & Co. ... 40
Anderson & Co., Wm. H. ... 50
Arnhold, Karberg & Co. ... 23

Babcock & Wilcox, Ltd. ... 35
Baldwin Locomotive Works. ... 17
Banco Español Filipino ... Cover
Bell, David W. ... 36
Belliss & Morcom, Ltd ... 40
Berliner Maschinenbau, A.-G. (late L. Schwartzkopff). ... 5
Bohler Bros. & Co., Ltd. ... 45
British-American Tobacco Co., Ltd ... 56

Campbell Gas Engine Co., Ltd., The ... 1
Carlowitz & Co ... 28
Chee Hsin Cement Co., Ltd. ... 52
China Import Export Lumber Co ... 63
China Mutual Life Insurance Co. ... 61
Chinese Government Railways of China ... 2, 4, 6, 14, 16, 20, 38
Chosen (Korean) Railway ... 12
Cia. General de Tabacos de Filipinas ... 58
Cia. Transatlantica. ... 58
Claflin Co., The H. B. ... 61
Clarke, M. A. ... 66
Cleeves & Co. ... 16
Commercial Press, Ltd. ... 72

Dampney & Co., Ltd., J. ... 46

Defiance Machine Works. ... 47
Deutsch-Asiatische Bank ... 46

Easterbrook, Allcard & Co., Ltd. ... 49

Fairbanks-Morse & Co. ... 56, 72
Fearon, Daniel & Co ... 40
Fiat-san Giorgio Ltd. ... 35
Frank L. Strong ... 42, 64

General Electric Co ... 39
Germinal Cigar & Cigarette Factory ... 57
Glasbeton (System Keppler) ... 68
Goulds Manufacturing Co. ... 43
Green Island Cement Co., Ltd. ... 51
Greene, Tweed & Co. ... 68, 71

Hannoversche Maschinenbau A. G., Vormals Georg Egestorff ... 22
Henschel & Sohn ... 22
Herbrand & Co., P. ... 24
Hongkong & Shanghai Banking Corporation. ... Cover
Hongkong & Whampoa Dock Co., Ltd ... 34
Honolulu Iron Works Co. ... 41
Hupeh Cement Works ... 52
Hurst, Nelson & Co., Ltd. ... 1

International Banking Corp ... Cover
International Correspondence Schools ... 69

Jardine, Matheson & Co. ... 30
Johnson-Pickett Rope Co. ... 48

Kailan Mining Administration (late Chinese Engineering and Mining Co., Ltd) ... 55
Keystone Driller Co. ... 45

Leeds Forge Co., Ltd., The ... 25
Leiman Bros ... 69
Lima Locomotive Works. ... 15
Lodge & Shipley Machine Tool Co. ... 3

Maffei, J. A. ... 21
Manila Railroad Co. ... 18, 19
Melchers & Co. ... 26
Middleton & Co., Ltd. ... 41
Mitsu Bishi Dockyard & Eng. Works. ... 34
Mitsui Bussan Kaisha. ... 54
Morse & Son, A. J. ... 68
Municipal Engineering & Contracting Co. ... 25

New York Engineering Co. ... 44
Norton, Harrison & Co. ... 70

Olsen & Co., Walter E. ... Cover

Pacific Mail S. S. Co. ... 59
Pacific Tank and Pipe Co. ... 70
Port Banga Lumber Co. ... 45
Pratt's ... Cover
Priestman Brothers, Ltd. ... 41

Racine, Ackermann & Co. ... 50
Railway Signal Co., Ltd., The ... 24
Rendrock Powder Co. ... 45

Robert Dollar Co. ... 24
Rose, Downs & Thompson, Ltd ... 44
Russo-Asiatic Bank ... 46

Schuchardt & Schütte, Berlin ... 49
Shanghai Dock & Eng. Co., Ltd., The ... 31
Shanghai Gas Co., Ltd. ... 60
Shanghai Machine Co. ... 43
Shanghai-Nanking Ry. ... 8
Shewan, Tomes & Co. ... 29
Siemens China Electrical Engineering Co. ... 37
Smith's Dock Co., Ltd ... 33
Southern Pacific Co. ... 60
South Manchuria Railway Co., Mining Dept. ... 53
South Manchuria Railway Co. ... 10
Standard Oil Co. of New York ... 62, 65
Stevenson & Co., Ltd., W. F. ... 70
Strauss Bascule Bridge Co. ... 47

Taikoo Dockyard and Engineering Company of Hongkong, Ltd. ... 32
Toyo Kisen Kaisha ... 59
Trussed Concrete Steel Co. ... 49
Tsingtauer Werft. ... 33

United States Steel Products Co. ... 7, 11, 27

Vulcan Iron Works. ... 35

Western Electric Co. ... 36
Westinghouse Brake Co., The ... 3
White & Co. (Inc.) J. G. ... 47

Yale & Towne Mfg. Co. ... 68
Ynchausti & Co. ... 66

Classified Advertisers' Directory

(Please mention this jonrnal)

Agricultural Implements
Anderson & Co., W. H.

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Cia. General de Tabacos de Filipinas.
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